A STUDY OF THE SELF-EXPRESSED NEEDS IN SCIENCE OF JUNIOR HIGH STUDENTS IN THE WINNIPEG INNER CITY SCHOOLS

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METRO KOWALIK

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A dissertation submitted to the Faculty of Graduate Studies of the University of Manitoba in partial fulfillment of the requirements of the degree of

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ABSTRACT

The self-expressed needs in science of junior high students in Winnipeg inner city schools was the subject of this research and recommendations for the development of science curriculum at the junior high level are expressed.

The necessary data was obtained by means of a questionnaire based on the students' self-expressed needs. The needs of the students are divided into five categories. These categories are the learning environment, methods of instruction, general attitudes toward science, the science curriculum content, and the students' opinions about science.

The population for the study consisted of grade seven, eight, and nine students from five Winnipeg inner city schools. These schools were: Aberdeen, General Wolfe, Gordon Bell, St. Johns, and Sisler. The population for the study consisted of nine hundred and forty-four students, of whom two hundred and eighteen students were classed as "low achievers" and seven hundred and twenty-six students who were classed as "other" students.

The responses were analyzed with a computer program. Statistical procedures included percentage scores, significant difference levels, and correlation coefficients.

The results are discussed and the present and future needs of junior high students with regard to science curriculum and instruction in the Winnipeg schools are noted.

High priority needs identified by the study are regular classroom learning environments, field trips, films, teachers helping students on an individual basis, class discussions, and student involvement in experiments. Low priority needs consist of open area learning environments and teaching by means of contracts. It was noted that the needs of the low achievers do not differ greatly from the needs of the other students.

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CHAPTER I

STATEMENT OF THE PROBLEM AND DESCRIPTION OF THE STUDY

Introduction

The general direction of the study was to see if it was possible to get some insight into the needs in science of inner city junior high students.

> In all the millions of words that are written annually about education, one viewpoint is invariably absent - that of the child, the client of the school. It is difficult to think of another sphere of social activity in which the opinions of the customer are so persistently overlooked.[1]

The Need for the Study

The impetus for a study of this nature occurred while the author was teaching science in a Winnipeg junior high inner city school.

It was noticed that certain students in grades seven, eight, and nine appeared to lose interest in science as they progressed through junior high. Often these students felt that they had no need for the subject. When confronted about their lack of interest they often replied that science was boring, that they disliked science, or what good would science do them once they left school. However, many of these students who were low achievers in science, frequently managed to get satisfactory grades in their other subjects. Also, school files indicated

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[1]Edward Blishen, ed. The School That I'd Like (Baltimore, Md.: Penguin Books, Inc., 1970), back cover.

that most of these students were of average intelligence.

This situation was recognized by other teachers in the science department and became a topic for discussion during science department meetings. Many teachers felt that the lack of interest in science at the junior high level was probably due to the type of course that was being offered. The textbook used at that time (1967) was Science Indoors and Out by Hensley, Patterson and Armstrong. It was felt that the text was outdated and that the material in the text was rural-oriented. Also it was felt that the course lent itself to too many fill-in-the-blank type questions. A number of teachers were of the opinion that the lack of student interest in science was due to the lack of provision for student participation in the laboratory. The science course was being taught primarily by teacher demonstrations and by having the students take notes from the chalkboard.

During 1968 the author's school staff embarked on an innovative educational program. In the following years various innovative programs were tried. Teachers were encouraged to try different philosophies along with various teaching methods. Some of these were: team teaching, large areas for instruction (open areas), individualization, self-pacing, continuous progress, continuous evaluation, no failure philosophy, a special form of home reports, field trips, student progress cards, and more student participation in the laboratory.

Also in 1968, a new series of science texts for junior high was adopted. The series by Thurber and Kilburn, Exploring Science (7,8 and 9), emphasized experiments with student participation. The school, in which the author taught, referred to it as the "discovery method". As part of the innovative program the school was renovated. Laboratory facilities were installed, e.g., tables, water supply, etc., and science equipment was purchased. The students were permitted and encouraged to participate in laboratory experiments.

Most of the students in grade seven showed a high degree of interest in laboratory work. However, it was noted that some students still lacked interest in science, in spite of the opportunity to do experiments in the laboratory. The number of these students increased in grades eight and nine.

Once again, some teachers were of the opinion that the grade nine course did not adequately fill the needs of many students. Many of the experiments proposed in nine Thurber did not lend themselves to an urban setting. A large number of studies and questions in the text required outdoor environmental studies and field trips. In most instances field trips were not possible.

In 1970 the grade nine Thurber text was exchanged in favour of Introductory Physical Science (I.P.S.) at the grade nine level. The science teachers felt that a greater opportunity to participate in the laboratory would arouse more interest in science. The assumption was that almost all children possess what have been called "intrinsic" motives for learning.[1] At the time of this study (1975) the problem situation still exists, especially in grade nine. The I.P.S. lab-oriented course does not seem to be the answer for many students. It would appear that the needs of some students have not been met in science.

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[1] Jerome S. Bruner, Toward a Theory of Instruction (Cambridge, Mass.: The Belknap Press of 1966, Harvard University Press), p. 114.

If their needs had been met, then students should have been motivated to learn. According to Shipton, "Needs and drives instigate goal directed behaviour, that is behaviour aimed at satisfying a need."[1]

This led the author to believe that a study of the needs with respect to science of junior high students, as they are able to identify these needs, may lend valuable information pertaining to future curriculum design.

The Study

There are two problems in this study of the self-expressed needs of junior high students. Each of the two problems has a series of related questions.

Problem One

To identify and compare the self-expressed needs in science of low achieving and "other" (see Definition of Terms, page 9) junior high students in Winnipeg inner city schools with respect to:

1. Learning environment
2. Methods of instruction
3. Attitudes toward science
4. Science curriculum content
5. Opinions of science

Questions Relative to Problem One

There are two types of questions for problem one. Questions one to four deal with information-gathering while questions five to nine

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[1]Ernest J. Shipton, Norman S. Endler, and F. Dean Kemper, Maturing in a Changing World (Scarborough, Ontario: Prentice-Hall of Canada, Ltd., 1971), p. 3.

deal with hypothesis testing.

1. What are the self-expressed needs of junior high students from inner city schools in terms of:
   (a) The learning environment
   (b) Methods of instruction
   (c) Attitudes toward science
      (i) present
      (ii) past
      (iii) and future
   (d) Science curriculum content
   (e) Opinions of science

2. How do the self-expressed needs of junior high students from inner city schools who are low achievers differ from other junior high students in terms of the five categories listed in question one?

3. What are the self-expressed needs of low achieving junior high students from the inner city schools in terms of the five categories listed in question one?

4. How do the self-expressed needs of junior high students from inner city schools who are low achievers differ between grades 7, 8 and 9 in terms of the five categories listed in question one?

5. How do the self-expressed needs of male junior high students from inner city schools who are low achievers differ from others as per the five categories?

6. How do the self-expressed needs of female junior high students from inner city schools who are low achievers differ from others as per the five categories?
7. How do the self-expressed needs of junior high students from inner city schools who are grade 7 low achievers differ from other grade 7 students in terms of the five categories?
8. How do the self-expressed needs of junior high students from inner city schools who are grade 8 low achievers differ from other grade 8 students in terms of the five categories?
9. How do the self-expressed needs of junior high students from inner city schools who are grade 9 low achievers differ from other grade 9 students in terms of the five categories?

Null hypotheses to be tested in questions five to nine:

1. There is no difference between the male low achievers and the male others with respect to each of the questionnaire items.
2. There is no difference between the female low achievers and female others with respect to each of the questionnaire items.
3. There is no difference between the grade 7 low achievers and other grade 7 students with respect to each of the questionnaire items.
4. There is no difference between the grade 8 low achievers and other grade 8 students with respect to each of the questionnaire items.
5. There is no difference between the grade 9 low achievers and other grade 9 students with respect to each of the questionnaire items.

Problem Two

To determine the relationship between the student "likes" (see definitions on page 9) of selected elements of the learning environment and their perceptions of learning with respect to these elements.

Questions Relative to Problem Two

1. What is the relationship between likes and perceived learning (as determined by the questionnaire) for all students in the sample?
2. What is the relationship between likes and perceived learning (as determined by the questionnaire) for low achievers in the sample?
3. What is the relationship between likes and perceived learning (as determined by the questionnaire) for other students in the sample?

The Procedure

The population for the study consisted of Winnipeg inner city school children in grades seven, eight, and nine who were identified as low achievers in science and inner city school children in grades seven, eight, and nine who were categorized as others. These were students who did not meet the criteria for low achievers.

The student population sample consisted of two-hundred and eighteen (218) students classed as low achievers and seven-hundred and twenty-six (726) students classed as other than low achievers. The total student sample population of nine-hundred and forty-four (944) was selected by arbitrarily picking various classrooms from five inner city schools. The schools were: Aberdeen, Gordon Bell, General Wolfe, St. John's, and Sisler.

The questionnaire was administered to the sample student population and the results were categorized as to:

1. The learning environment
2. Methods of instruction
3. General attitudes toward science--present, past, and future
4. Science curriculum content
5. Opinions of science

The responses in each category were analyzed and a tabulation of the analysis was made in response to the questions posed in problems one and two on the preceding pages. The tabulation of the analysis is then discussed.

The Instrument

The instrument design was based on responses received from taped interviews with junior high students. On the basis of these responses the questionnaire was constructed (Appendix A).

The subjects' modes of responses to the sixty-five questions in the questionnaire consisted of three choices: agree, undecided, and disagree. All sixty-five questions consisted of positive statements. In addition there were three open-ended questions.

Limitations of the Study

The following limitations were recognized in the study:

(i) All the inner city schools were not included.

(ii) The questionnaire did not sample all the needs of the students.

(iii) The entire student population was not sampled.

Definition of Terms

(i) Need--is a desired element within the learning procedure of the student.

(ii) Low achievers--those students with an I.Q. of greater than 90 who have a majority of marginal or unsatisfactory teacher marks for the past two years.

(iii) I.Q.--is an abbreviation for Intelligence Quotient as measured by an Otis Quick Scoring Intelligence Test.

(iv) Inner City Schools--schools in the Winnipeg School Division No. I, within the following boundaries: Main Street to the east, Assiniboine River to the south, Wall Street and Keewatin Street to the west, and Inkster Boulevard to the north. The schools surveyed were: Aberdeen, General Wolfe, Gordon Bell, St. John's ,. and Sisler.

(v) Other students--these were students of average or above ability who did not fit into the definition of the low achievers.

(vi) Likes--are categories from the instrument dealing with the degree of a student's reception of selected elements of the learning environment.

(vii) Learning--are categories from the instrument which deal with degree of the student's perception of the selected elements.

Summary

Chapter One consists of the introduction, the purpose, the study, the two problems, the questions related to the two problems, the procedure, the instrument, the design, the limitations and the definition of terms. Chapter Two will review the literature which was considered by the author to be relevant to this study. Chapter Three deals with the design of the study. Chapter Four contains data in tabular form along with the interpretation and discussion of this data. Chapter Five summarizes the major findings, the order of self-expressed needs, interpretations of the findings and recommendations.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

This chapter will present a review of related literature in two parts. Part one consists of the feasibility (pros and cons) of using student self-expressed needs in designing, restructuring, and re-evaluating the curriculum. The second part consists of a review of the various programs and projects in education that have based curriculum on student needs through the past century.

Part One

The Literature which Supports Using Students Self-Expressed Needs in Curriculum Design

Ever since the 1850's when public education became available in the industrialized countries, educators have been trying to find the ideal way of teaching students. There has been a desperate search, especially in the teaching of science, for a single aim, action, or curriculum that would eliminate all difficulties. According to Hurd there is no simple solution.

> But the message is now beginning to seep through: there is no educational panacea. For that fruitless search must be substituted a general program of never-ending sequences of soul searching, restructuring, testing, and re-evaluation.[1]

[1] Hurd, Paul de Hart, "Biological Sciences Curriculum Study No. 1", Journal of Research in Science Teaching, 1, 1, (1963):95.

What we probably need is a curriculum designed to meet the interests and attitudes of students in different areas. Some of these student interests might be found by having students from a particular community express their interests and needs.

In the past one series of text books has served all the students in a province or state. Surely there must be regional differences in needs and interests. This idea is supported in the research of Champagne and Albert.

> The curriculum developer has to bear in mind that he is not writing another text book, but that he is laying out a plan for a road to follow a map. The objectives are the learner's "destination" on the map. In continuation of his education, they form the core for objectives on a higher level, the destination of his continued "trip".[1]

If the self-expressed needs of the learner were known to the educator, it might help him to lay out the plan.

A great number of research educationalists have assembled pertinent and relevant advice for curriculum construction. Crawford states, "Meaningfulness of materials promotes learning."[2] What better way is there to find out what materials are meaningful to students in a particular community or area than to ask them?

If a student is to learn, he must have a need; this need will create a drive which will be directed toward a goal, that is, the materials to be learned.

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[1]Audrey Champagne and Anne Albert, Development and Evaluation of an Experimental Curriculum for the New Quincy (Mass.) Vocational-Technical School. The New Science Curriculum (American Institute for Research, Pittsburg, Pa.: ERIC Document Reproduction Service, ED 047158, Sept. 70), p. 16.

[2]M.P. Crawford, "Concepts of Training" in Psychological Principles in System Development, ed. R.M. Gagne (New York: Holt Rinehart, and Winston, 1963), p. 5.

According to Champagne and Albert

> It will be helpful to you to clarify in your mind the meaning of "learning". Teachers and psychologists have found principles that will assure successful learning. Think about these principles and you will find that they are applied in your physics learning activities.
>
> Principle 1: Learning must satisfy a need.
>
> The "objective" and the "overview" in each activity try to relate your own personal real life experience and your curiosity to a fact and theory of physics.[1]

This could very well apply to other areas of science as well.

If a curriculum is to be relevant, then it must take into consideration the needs of the pupils to whom it is to apply. According to Ford

> The National Science Foundation in updating the scientific and mathematical studies in schools through use of practising scientists and scholars, quickly discovered that, in order to get material that was teachable, they needed to involve teachers and pupils.[2]

Since communities are different from each other, it stands to reason that their children will have different needs and require a course of study which will satisfy these needs. This is supported by Ford.

> We also need to look carefully at the particular situation of children and youth at the school that concerns us, because there are not only differences within any school but also communities differ in respect to the background of children, what they have learned previously, what kind of attitudes they have towards learning.[3]

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[1] Champagne and Albert, op. cit., p. 31.

[2] G.W. Ford, The Structure and Knowledge of the Curriculum (Chicago: Rand McNally and Company, 1964), p. 5.

[3] Ibid., p. 4.

It is possible that the attitudes of children in inner city schools toward science may be obtained from a survey. According to Bruner

> It would seem much more sensible to put evaluation into the picture before and during curriculum construction, as a form of intelligence operation to help the curriculum maker in his choice of material, in his approach, in his manner of setting tasks for the learner.[1]

Sawrey and Telford state that the study of needs could serve to determine attitudes toward subject materials. "The whole area of attitude toward schooling and its application is vital to the eventual transfer of training."[2]

Emphasis must again be placed on the relevance of the curriculum to the learner. According to Robinson

> The term "relevance" in education implies that what is to be learned is perceived by the learner as having meaning to his present life and the expectation that it will have utility in the future learning or coping with situations.[3]
>
> We have not been making enough contact with the types of materials and experiences the student faces in his environment in the classroom or outside it.[4]

Furthermore studies have shown the importance of taking students' needs into consideration. According to Curtes

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[1]Jerome S. Bruner, Toward a Theory of Instruction (Cambridge, Mass.: The Belknap Press of 1966, Harvard University Press), p. 30.

[2]James M. Sawrey and Charles W. Telford, Educational Psychology (Boston: Allyn and Bacon, Inc., 1958), p. 173.

[3]Alan H. Robinson, Communications and Curriculum Change (ERIC Document Reproduction Service, ED 042570, May 70), p. 1.

[4]Ibid., p. 7.

> Emphasis must be placed on the needs and interests of individuals, and curriculum must be constructed to enable students to actualize their own potentialities.[1]

> Up to date information is needed on our present student population, their interests, their values, their attitudes, as well as achievement and ability information.[2]

The Illinois State Commission on Urban Education states that the community be involved in curriculum planning, the feelings of the community could be ascertained from the self-expressed needs of the children. The material in the curriculum should be relevant to that particular community. This view is expressed by Ferguson and Sperry in their research.

> A fourth type of involvement is an extension of the third. In this case the professional personnel share responsibility for curriculum planning with lay citizens. Those suggesting this approach advocate the same general beliefs as those who would include all members of the school staff. They also recognize that basic decisions relative to what should be taught in schools ought to be made by members of the school's neighbourhood or the community in which the school is located. This is what may refer to community control. For only by including representative laymen in the process of curriculum planning can the experts and teachers be assured that they are carrying out the wishes of the community. A further advantage of this strategy lies in the strength of support for the urban school program that results from community representatives being readily conversant with the goals, nature and content of the curriculum adopted.[3]

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[1]Thomas E. Curtes, What is a Humanizing Curriculum (ERIC Document Reproduction Service, ED 050464, Feb. 71), p. 1.

[2]Donald G. Ferguson, Student Involvement, A Working Paper (ERIC Document Reproduction Service, ED 050465, Feb. 71), p. 4.

[3]Len T. Sperry, The Curriculum System Operating in Urban Schools (Illinois State Commission on Urban Education, Springfield: ERIC Document Reproduction Service, ED 044453, May 70), p. 3.

Second a thorough acquaintance with the characteristics of children and youth in general, as well as with the particular characteristics of the current students, must be part of the repertoire of those who plan the curriculum.[1]

Two important internal criteria that should be foremost in the planner's thinking are accuracy and relevance. With regard to accuracy, Ralph Tyler suggests that an estimated one-third to one-half of the content of current textbooks is either false and distorted or no longer considered important by scholars. Certainly, curriculum planners must be aware of this limitation both in terms of selecting textbooks and in the actual curriculum planning, since it is commonplace for planners to base their curriculum upon the master design of the textbook series.[2]

The curriculum content currently in use is also unsatisfactory if it does not speak to the concern of the students.[3]

Fonteni and Weinstein offer the curriculum planner another caution or constraint. In addition to the school's formal curriculum, curriculum planners must be aware of the pervasive influence of a second curriculum, the less formal hidden curriculum. Many para-school forces such as mass media, social agencies, and peer groups to name a few, are constantly at work shaping the student's interests, attitudes, and values. Fonteni and Weinstein argue that the education and socialization of any given child is far from limited to the four walls of the classroom, in that just as the formal curriculum has a school setting, which is subdivided into classroom units, and produces a student culture, so the hidden curriculum has a neighbourhood setting which is subdivided into family units and produces a sibling and peer culture.[4]

Obviously, if the formal curriculum is to achieve its purpose, it must be consistent with, or at least accommodating of, the learning imparted by the hidden curriculum. Certainly, the incongruence between formal and hidden curriculum is strongest in the inner-city school.[5]

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[1]Ibid., p. 5.

[2]Ibid., p. 6.

[3]Ibid., p. 7.

[4]Ibid., p. 7.

[5]Ibid., p. 8

Research done by Sutton and others support the idea that

> Curriculum should be an on-going process, vital and related to everyday life, involving all areas of instruction. Not that this approach isn't valid for all students but our under achieving students lack other motivations and supports to sustain them.[1]

Since inner city schools contain a large number of culturally disadvantaged children, these children have needs which are quite often different from needs of children in other areas. Therefore, to fulfil these needs, inner city children would require a curriculum which may differ from the general curriculum. According to Sutton and Brazziel

> Culturally disadvantaged children can learn well when they are offered a realistic curriculum and realistic materials of instruction.[2]
>
> Given a different and more realistic curriculum and different and more realistic materials of instruction, these children learn and they learn well.[3]

Research done by the Minneapolis Public School Community Health and Welfare Council indicates the following need.

> Culturally deprived children in Target Area Schools need a curriculum which is related to their experience and is adapted to their specific needs. Lower class junior high students find the pressures of competitive mixed class school extremely frustrating.[4]

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[1] Jeannette Schur Sutton and others, A Program to Increase the Motivation of Low Achieving Students. Final Report (N.Y.: Syosset Central School District 2, ERIC Document Reproduction Service, ED 036954, 1968), p. 67.

[2] William F. Brazziel, Instructional Materials for Low Achievers (Norfolk, Virginia: General Education, Norfolk Division, Virginia State College, ERIC Document Reproduction Service, ED 002281, April 1964), p. 1.

[3] Ibid., p. 2.

[4] Minneapolis Public School, Community Health and Welfare Council, Curriculum Development for Target Area Schools (Minneapolis, Minn.: Minneapolis Public Schools, ERIC Document Reproduction Service, ED 001807, April 1964), p. 1.

Research on school dropouts has placed great emphasis on the needs and goals of students, and these needs be met in curriculum planning according to research done by Watson and Tuckman.

> Educators commonly state their problem in terms of motivation. We provide excellent facilities, counseling, and encouragement,but these are not enough. How can we motivate these young people to want to learn? How can we strike the spark of ambition? What is the key to the transformation of an unresponsive, apathetic adolescent into one who is actively motivated to achieve? How do we generate drive?[1]

> Develop curriculum units that are relevant to the present life and interests of pupils. The traditional school curriculum evolved to meet the needs of an upper and middle class culture living in a pre-industrial society. It depends for motivation on the long time perspective, assuring youngsters that what they are learning now will be important some day or will open doors to college or professional careers.[2]

> Thus, a curriculum must be defined in terms of educational goals of students. This is synonymous with saying that it must be defined in terms of the educational needs of the students.[3]

In the past when curricula were being designed, scientists, teachers, and psychologists took part in the construction. One one bothered to get the student's view, the view of the one to whom the curriculum was to apply. The best judge of good teaching practices and the curriculum is the product--the student. Patton and De Sena make this point in stating,

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[1]Goodwin B. Watson, No Room at the Bottom (The National Educational Association of the United States, 1963), p. 2.

[2]Ibid., p. 90.

[3]Rutgers Tuckman, The Student-Centered Curriculum. A Concept in Curriculum Innovation (New Brunswick, N.J.: The State Univ., ERIC Document Reproduction Service, ED 032616, March 1969), p. 1.

> Although we as teachers place a great deal of value in what is said at conventions and conferences and what we read in the educational journals, too often we do not heed the opinions of those we are presuming to educate.[1]

Thus, in any method employed to design and evaluate curriculum and methods of presentation it would be feasible to include the views of students. According to a study done by Marquis,

> Direct student involvement in matters of curriculum must be instituted in schools where it is non existent and it probably should be expanded in most schools where it already exists.[2]

In the past, even though scientists, teachers, educators, and psychologists were responsible for curriculum design, there was often lack of communication between the groups mentioned. Bruner says in describing the Woods-Hole Conference of 1959,

> Strange as it may seem, this was the first time psychologists had been brought together with leading scientists to discuss the problems involved in teaching their various disciplines.[3]

The curriculum designer must take into account the values held by the society and a particular community. Neagley states that

> The first step in curriculum development is the identification of the values held by society as a whole and the community in particular. The

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[1]Robert A. Patton and Paul A. De Sena, "Identification through Students' Opinions of Motivating and Non-Motivating Qualities of Teachers", Journal of Teacher Education (Spring 1966):41.

[2]Romeo Marquis, "Curriculum Development: Can Students be Involved?", Education Digest, 39 (Nov. 1973):57.

[3]Jerome S. Bruner, The Process of Education (Cambridge: Harvard University Press, 1966), p. ix.

> values of the community, of the curriculum workers, and the classroom teachers determine basically the purposes, objectives, and outcomes of the school curriculum.[1]

It might well be that some of the values held by the community could be learned from student-expressed interests.

Studies conducted recently have shown that there is a need for structure in the curriculum. High structural curriculum taught to grade eight students had a greater effect than low structural curriculum.

> The results of the study show that knowledge acquisition is directly related to the amount of structure in a curriculum. These results were obtained with biology lessons taught to eighth grade students.[2]

It may be possible to get students' views that would give the curriculum designer insight into the amount of structure that is required by a low achiever.

Student needs go hand-in-hand with student interests. If the needs can be identified, then, this may identify the student interests and thus facilitate the teaching in order that learning may take place.

> Interest has long been recognized as a major factor in the learning process. Realizing the importance of interests, those who are developing new science programs for children have attempted to stimulate and maintain the interest of the learner. The value of the pupil interest is understood and accepted, but the continuing problem is in the identification of these interests.[3]

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[1]Ross L. Neagley, and N. Dean Evans, Handbook for Effective Curriculum Development (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1967), p. 196.

[2]Robert K. James "A Comparison of Group and Individualized Instructional Techniques in Seventh Grade Sciences", Journal of Research in Science Teaching, 9, 1 (1972):72.

[3]Charles L. Koelsche and Lloyd S. Newberry, "A Study of the Relationship between Certain Variables and the Science Interests of Children", Journal of Research in Science Teaching, 8,3 (1971):237.

According to Bruner

> Perhaps the most important thing we can do for a growing child from the intellectual point of view is to design curricula for him that permits him to achieve skill in at least one area of knowledge, to experience the self-rewarding and confidence-giving pleasure of going deeply into something.[1]

This can only be done if one first knows what the students' interests are. Perhaps by allowing students to express their needs, one will be able to find out what it is that gives them confidence and pleasure. Suchman explains that the child must be free to decide for himself what data will be needed to find his own answers to his own problems.[2] Buth feels that "the learning of science will be at its best when the student himself initiates actions . . ."[3] Merrill likens the role of the teacher to "the physician who meets his patient, evaluates his condition, prescribes a treatment, and after an appropriate interval, again diagnoses to see if the patient has received the proper treatment."[4]

The low achiever, by expressing his needs, may be able to help the teacher with his diagnosis.

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[1] Jerome S. Bruner, "Liberal Education for all Youth", The Science Teacher, 32 (November, 1965):19-20.

[2] Alphoretta Fish and Bernice Goldmark, "Inquiry Method: Three Interpretations", The Science Teacher, 33 (Feb. 1966):13-15.

[3] Joseph J. Schwab, "Enquiry, the Science Teacher and the Educator", The Science Teacher, 27 (October 1960):6-11.

[4] Richard J. Merrill and David P. Butts, "Vitalizing the Role of the Teacher", 1969, National Science Teachers Association, Washington, D.C., pp. 35-42.

Children should be allowed to express their needs and interests so teachers can tailor this fundamental knowledge by means of curriculum development to meet these interests. As Bruner states, "We must learn to tailor fundamental knowledge to the interests and capacities of children."[1]

The North American education system is, in general, considered to be decentralized rather than centralized as in Australia, with the entire responsibility being in the hands of the state.[2] Even with decentralization, science curricula are quite often the same throughout the entire province. In order to be fair to the needs of different communities, it is often a "middle-of-the-road" type of curriculum. In many states and provinces the curricula is based on the needs of the middle and upper classes.[3]

In today's society there are tremendous differences among communities with respect to moral and social values, economic status and racial backgrounds. Yet, one curriculum which is based on the needs and values of the upper and middle classes is expected to be suitable and serve the needs of children in the inner city community, the suburbs, and the rural areas. The fact remains that the needs and social values of children in an inner city community are as different from a rural community as night is from day.

At present and in the recent past, high school student movements have been demanding student rights. Students are demanding to be heard

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[1]Jerome S. Bruner, The Process of Education (New York: Random House, 1965), p. 20.

[2]Ontario, Royal Commission on Education, 1950, p. 180.

[3]Watson, op. cit., p. 90.

and to have the right to have a say in their education. It appears that the time has come for a need to have a place where students' views can be expressed.

According to Fontini

> Recently, certain students have raised the quite fundamental question of whether a student is actually a citizen, protected by the Constitution of the United States. Those concerned with student rights, such as Ira Glasser, have argued convincingly for a Bill of Rights for Students.[1]

It seems that at present the curriculum is not meeting the needs of the student as they apply to his community. The following quotation appears to support this.

> Though he may acquire some general and ultimately helpful information in the process, the American public school student is fed a banquet of absolutes from a cafeteria of uncertainties. Apart from the jolting discrepancy between the platitudes of the textbook and the realities of the world, the teacher rarely allows the world into the classroom. Little course content deals honestly (if at all) with the local community surrounding the school or with the community at large.[2]

An invitation by the Observer, an English newspaper, was forwarded in 1967 to English school children of junior high age and up. It asked them to describe the type of school they would like. Many students of this age appeared to have a clear idea of what a school should be. This is supported by the following quotations: "Schools usually have one thing in common--they are institutions of today run on

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[1] Mario D. Fontini, The Reform of Urban Schools (Washington, D.C.: National Educational Association, 1970), p. 27.

[2] Ibid., p. 27.

the principles of yesterday." 15-year old girl.[1] "I consider it essential that the school should change with the body of pupils it contains and with the society in which they must be adapted to live." Lesley, 17.[2] "School was not invented just for little people to become the same as big people."[3]

The Literature which Does Not Support Using Students Self-Expressed Needs in Curriculum Design

On the other hand, one can question the desirability, validity, and reliability of obtaining student self-expressed needs with regard to the curriculum. Do students at the junior high level age really know what they want? Are their responses reliable or are they simply whims of youth? What if a student expresses a need that "he does not require science as a discipline"?

Do students have the right to say that they do not need a science education or choose their own curriculum based on their present needs or lack of interest, and later become burdens of society? One might ask, "Does the dog's tail have the right to wag the dog"?

The self-expressed needs of under achievers in science may turn out to be that they feel that they do not require science. Why not let these students drop science altogether? Does everyone need to have an interest or a need for science? The following passage would indicate that most of today's students will never have a direct use for science once they leave school.

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[1] Edward Blishen, The School that I'd Like (Baltimore, Md.: Penguin Books, Inc., 1970), p. 7.

[2] Ibid., p. 21.

[3] Ibid., p. 7.

> The goal of preprofessional preparation is appropriate for young people planning to become scientists and engineers, but only a small minority of the total population is engaged in these professions. Scientists and engineers today constitute and within the foreseeable future will constitute somewhere between 5 and 10% of the total labour force in the United States. This means that more than 90% of all working people are engaged in occupations that are not directly related to science. When this number is added to the proportion of women who are housewives and mothers, but who are unaccountably designated as "unemployed", it becomes clear that almost everyone is a non-scientist. For the non-scientist, preparation for a scientific or science-related career cannot be the goal of education in science.[1]

The United States Department of Health, Education and Welfare expresses the following opinion on this situation.

> There is an intimate relationship between schooling and the economic health of a nation and its citizens. Prosperity demands productivity and productivity demands trained talent. Education develops the intellectual and manual skills which underlie the productive abilities of individuals and nations today. Nations with the highest general level of education are those with the highest economic development. Schools, more than natural resources, are the bases of prosperity. The modern economy demands not muscle but skill and intellect. As energy is produced increasingly by mechanical means, the man who has only his energy to sell is increasingly becoming dispensable.[2]

Our way of life is our school system. Low achievers, by not functioning in this system seem to be rejecting our way of life. It might be said that even though many young people today reject our way of

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[1]Leopold E. Klopfer, "The Teaching of Science and the History of Science", Journal of Research in Science Teaching, 6, 1 (1969):87.

[2]U.S., Department of Health, Education, and Welfare, Office of Education, <u>Policy Outcomes in Education</u>, 1967, p. 8.

life within a society that has its pollution, waste, emphasis on material things and profit, these same young people do not hesitate to hitch a ride as an alternative to walking, a ride in a modern new car with a middle-aged person as the driver, whose values on work and progress are different from theirs; and the car which pollutes the environment, and is a product of our industrialized, inhuman society. According to the U.S. Department of Health, Education and Welfare,

> Education does not guarantee health, wealth, or civic virtue; but sickness, unemployment and crime are prevalent among the undereducated segments of the population and all undermine prosperity. Their cost is expressed in human and social decay and in public expenditures for police, relief, and treatment of preventable illness. Where ignorance generates poverty, poverty perpetuates ignorance, and the whole nation is weaker.[1]

What if students show a need that they are willing to accept responsibility for their own learning? Can junior high students of low calibre be given this responsibility? Reports of visitors to ISCS classrooms have suggested that they cannot.[2]

> However, the following tend to be supported by this research: (1) The students' interest in science did not tend to be different between the two groups. This does not agree with the results reported for year-long courses employing programmed materials. (2) Failure to find differences in the achievement between the two treatments tends to support the idea that students in the individualized treatment are able to assume responsibility for their learning, and profit from an environment which has been judged by observers as "chaos". (3) As to interaction of the individualized treatment with ability levels, this study

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[1]Ibid.

[2]Arnold L. Trindale, "Structures in Science Teaching and Learning Outcomes", Journal of Research in Science Teaching, 9, 1 (1972):72.

> did not provide evidence to support the contention that poorer students are more apt to profit from individualized instruction. (4) The teacher investigator did find that this classroom can be managed.[1]

The above study tends to indicate that the under achieving student does not respond well to individualization, which should somewhat allow to meet student's individual needs with respect to learning.

> Irrespective of the method by which students in the upper I.Q. groups are instructed, they achieve significantly better than those in the lower I.Q. group, in respect to the following criterion measured: overall achievement, verbalization of concepts, recognition of concepts, and the application of concepts to numerical problems.[3]

Could it be that the needs of the low achiever cannot be met by any curriculum?

Some educators[3] are of the opinion that too much education causes people to have high expectations in their type of work and in life. The job these people get may not fulfil their expectations and consequently they become bored and unhappy. Their levels of educational knowledge is not always required of them in assembly line type of production work and thus is wasted.

However, another point of view indicates that with our contemporary technology, based almost entirely on scientific principles and knowledge, everyone would be required to have some knowledge in science

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[1] Ibid., p. 95.

[2] Yeghia Babikian, "An Empirical Investigation to Determine the Relative Effectiveness of Discovery, Laboratory, and Expository Methods of Teaching Science Concepts", Journal of Research in Science Teaching, 8, 3 (1971):201.

[3] Howard M. Johnson, "Compulsory Attendance Laws: Are They Outdated?", Phi Delta Kappan, IV (December 1973):226-232.

in order to understand, or at least to appreciate the world around them. Science may enable people to see the need for conservation of our resources and environment which is important to all of us. The following statements support this view.

> The Education in science appropriate for everyone in schools and colleges is one that will contribute to the individual's scientific literacy. For every man and woman who hopes to function effectively as a citizen of society in the twentieth century, literacy in science is an essential requirement. It is necessary to enable the individual to make intelligent choices about his personal well being in a rapidly changing environment and about his support of the work of scientists . . . an individual is not personally engaged in a scientific or science-related occupation, he needs to have some functional understanding of scientific ideas to be able to comprehend the phenomena and the changes in the natural world in which he lives. . . . It is essential that every student come to full comprehension and appreciation of the work of scientists as they seek understanding of the natural world through the construction of networks of ideas . . . understanding of scientific concepts and inquiry are without substance if students are unaware of the impact of science and related technologies on contemporary society.[1]

> Let us begin by taking note of four curriculum problems. These are the problem of (1) determining ends, (2) selecting content, (3) organizing content, and (4) evaluating curricula. . . . According to Tyler, there are four ends of education--milieu, learner, teacher, and subject matter. These classes are not merely alternate available positions, but are the starting points for different social forces acting on the curriculum.[2]

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[1]Ibid., p. 88.

[2]Michael F. Connelly, "Philosophy of Science and the Science Curriculum", Journal of Research in Science Teaching, 6, 1 (1969):108.

In the past the learner has had very little direct social force in influencing the design of the curriculum. Only recently have attempts been made to find out what the needs of the learner are.

Thus, for example, Schwab writes that

> 'In our time, however, the reasons (for curriculum reform) which are most urgent and compelling stem from the milieu. They are matters concerning our welfare'. The job of the high school science instruction is to train future scientists and a citizenry anxious to support them.[1]

The milieu, which is our society in their part of the social force acting on the curricula, seem to feel that the job of the school is to produce scientists and educated people knowledge-wise, not necessarily look for ways to meet the self-expressed needs of students with respect to science. It would appear that the personal wishes of the individual are to be sacrificed for the good of the society as a whole.

Another point to consider is that by the time the low achiever is at junior high level it is too late to try to arouse an interest for science in him. It may be that the previous environment, home or school, has left a permanent mark on the low achiever. This view is supported by Havighurst.

> Work by Havighurst and his collaborators in Quincy, Illinois, indicates that mental processes are less amenable to corrective efforts than are social and emotional problems. They selected for special treatment a group of sixth grade children who seemed by their past activities, to be inclined toward delinquent behaviour. It was possible to assist these young people to adapt more adequately to the classroom situation and to reduce undesirable

[1]Ibid., p. 109.

> behaviour, but almost no progress was made toward increasing scholastic achievement or potential.[1]

Studies with rats show that only learned experiences along with environment leave a permanent mark on the subject.

> What are the differences between pupils and school staff that cause difficulty for the inner-city school? What are the differences between school and parents (as reflected in pupil problems and behavior) that cause difficulty in this type of school?
> These differences can best be seen as gaps between the school and the pupils in knowledge, skills, and values.[2]
>
> More difficult for people to understand and cope with is the value gap between school and pupil.[3]

Differences such as the forementioned might be better resolved if more insight were gained into the students' values as obtained through a conducted study which was based on the student's self-expressed needs and interests.

Summary of Part One

In the preceding pages the author has highlighted some of the strong points and some of the drawbacks of taking students' needs and interests into account for purposes of establishing a curriculum.

Certain studies have indicated that we as teachers can gain no knowledge from students' self-expressed needs and interests for the purpose of curriculum development. Many studies, however, indicate that

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[1]Robert D. Hess, "The Latent Resources of the Child's Mind", Journal of Research in Science Teaching, 1, 1 (1963):24.

[2]Robert D. Strom, The Inner-City Classroom: Teacher Behaviours (Columbus, Ohio: Charles E. Merril Books, Inc., 1966), p. 46.

[3]Ibid., p. 47.

the student can play an important role in assisting the curriculum planner and developer

Part Two

The idea of trying to meet students' needs is not new. Educators have tried to fulfil students' needs since early pedagogical times with various programs, methods of instruction, and other innovations in education. The following pages describe several different plans and projects that educators have tried. These are both modern and historical. Today, as much as in the past, there are gaps in the curriculum which do not fulfil the needs of a particular class of student.

Individual differences and individual needs were recognized very early in American schools. A variety of methods have been tried in order to promote learning.

> For well over a century, educators have been trying to devise ways of teaching the individual learner. The rapid expansion of compulsory education (thirty-one states by 1890) forced upon the school at least partial awareness of some individual differences.[1]

Self-paced unit plans have been tried to meet students' needs. The Pueblo Plan[2], initiated by Preston Search in 1888, was a laboratory scheme which permitted a student to pace his coverage of the course rather than await his turn in daily recitation.

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[1] Margaret Rasmussen, Individualizing Education (Washington, D.C.: Association for Childhood Education International, 1964), p. 4.

[2] Maurice Gibbons, Individualized Instruction: A Descriptive Analysis (New York, New York: Teachers College Press, 1971), p. 3.

The St. Louis Plan[1], introduced in 1868 by William T. Harris, superintendent of schools in St. Louis, encouraged the development of kindergarten and introduced the teaching of elementary school science. The plan was an attempt to meet pupil needs by breaking the rigidity of the graded school.

The turn of the 20th century and the 1920's produced more plans and ideas in education which attempted, in one way or another, to meet students' needs.

The Platoon System[2] was initiated by William A. Wirt of Gary, Indiana. A typical platoon school organization called for the division of children into two sections or platoons, with one platoon using the basic classrooms for the study of the basic academic subjects, while the second platoon is engaged in non-academic activities in a special classroom, the auditorium, and the gymnasium. "The Activity Movement seemed to be the answer for those who wanted to do something about the varying needs and abilities of children."[3]

Other schools tried to provide for individual differences and needs through the multitrack grouping.[4] Three tracks (rates) of progress were used: fast, average, and slow. The fast track enabled the

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[1] George I. Thomas and Joseph Crescimbeni, Individualizing Instruction in the Elementary School (New York: Random House, Inc., 1967, p. 25.

[2] Ibid., p. 28.

[3] Ibid.

[4] Ibid., p. 26.

bright child to go at his own rate while the slow track was intended to meet the needs of the slow learner.

The Dalton Plan[1], introduced by Helen Parkhurst in a high school at Dalton, Massachusetts, in 1919, was an attempt to meet students' needs by socializing the school and preventing school life from becoming too mechanical. Pupils signed for job contracts at the beginning of the month or twenty-day period. The pupil was then free to work on the completion of the job at his own rate. He had an option of working in each of several subjects each day or work in one subject for an extended period of time until he had completed the job contract in that particular subject. However the student could not advance in any subject to the next job contract until he had completed his job contracts in all of his subjects. Morning hours were devoted to academic work while afternoons were used for non-academic studies such as art, music, physical education, etc.

With the 1930's came the depression followed by World War II in the first half of the 1940's. In the 1930's the nations did not have financing for educational innovations. The first half of the 1940's found the people too pre-occupied with the war effort, while during the latter part of the 40's the people's energies were directed at rebuilding and repairing that which had been damaged or lost during the war years.

With the 1950's came the start of educational innovations. This trend accelerated during the 1960's and would appear to be gaining even

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[1] Ibid.

more momentum in the 1970's. The Summerhill School[1] founded in 1921 by A.S. Neill at Leiston, Suffolk, England, comes to the forefront in the 60's. This was probably the first school which tried to cater to student self-expressed needs. Neill claims that Summerhill is a school made to fit the child, rather than the child being made to fit the school.

> . . . at Summerhill with two important exceptions: attendance is entirely optional, and the students in the weekly "town meeting" can speak and vote for changes in most aspects of school life, including curriculum and teaching. Summerhill is a self-governing school in all but matters of health and safety. The activities of the afternoon are decided individually and are pursued without supervision unless desired, whenever the student chooses to play or work--in school, on the grounds, or in the community.[2]

The theme at Summerhill is freedom with the student being responsible for controlling his behaviour. However, the student is responsible to his peers, by whom he may be punished for breaking their rules.

Other schools in England have followed Summerhill's example. The theme has become freer education based to a greater degree on the students' self-expressed needs and interests, with the emphasis being on self-direction, individual responsibility, and freedom to learn beyond the narrow limits so frequently imposed in formal schools.

The Steban Primary School[3] in the East of London, England, is

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[1] A.S. Neill, Summerhill: A Radical Approach to Child Rearing (New York: Hart Publishing Co., 1969), pp. 13-23.

[2] Gibbons, op.cit., p. 48.

[3] Audrey D. Sutton, Ordered Freedom (Encino, California: International Centre for Educational Development, 1970), pp. 1-5.

both an infant school for children aged five to seven years, and a junior school for children aged eight to eleven years. The school focuses its attention on the needs, interests, and happiness of children, rather than on textbook orientation and discipline. The school was built in 1951 and its new philosophy and methodology toward education was started in the early 1960's by its headmistress Audrey D. Sutton.

Open education which is based on the needs and interests of children is gaining a stronghold in many schools.

> Open education, unlike the curriculum reform effort of the past decade, is raising questions about the nature of childhood, learning, and the quality of personal relationships among teachers and children. It challenges many assumptions about the organization and purpose of schooling. Advocates of open education argue, for example, that learning is a personal matter that varies for different children, proceeds at many rates, develops best when children are actively engaged in a variety of settings in and out of schools, and gains intensity in an environment where children--and childhood--are taken seriously.[1]

English primary schools have had a particularly strong influence on the development of open education in North America. The movement toward more informal styles of teaching and learning took place over a forty-year period in English schools. There may be an inherent danger of overlooking the long developmental process that took place in England. The changes that initially started in the infant schools,

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[1]Vito Perrone, Open Education: Promise and Problems (Bloomington, Ind.: Phi Delta Kappa Educational Foundation, 1972, p. 8.

fostered changes in the junior schools for pupils of eight to eleven years of age. In the 1960's informal approaches became more common. The publication of the Plowden Report, in 1967, gave official support to informal practices taking place in a large number of infant and junior schools throughout England.

The Plowden Report was enthusiastic in its reaffirmation of the need to organize primary education around the needs of children, their pattern of growth, their interests, and their play.[1]

The Leicestershire Schools of England exemplify open education schools which are trying to meet self-expressed needs of children to some extent. The day is free or integrated where there is no difference between one subject and another in the curriculum, whether it be work or play. There are generally no required subjects and no required assignments. Gibbons relates that "The fluid pattern in Leicestershire schools is a loose organization of changing activities which students follow if they choose to but at their own time, unprompted by bells."[2]

However, one may start to question the wisdom of having freer education with its student oriented schools as its being done in England and other countries. According to an article in the Winnipeg Free Press,[3] the quality of education is on the decline. Literacy

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[1] Lillian Weber, The English Infant School and Informal Education (New Jersey: Prentice-Hall, Inc., 1971), p. 20.

[2] Gibbons, op. cit., p. 36.

[3] "British Educational Crisis", Winnipeg Free Press, 14 April, 1975, p. 29.

is declining. Half of the adult illiterates are below the age of twenty-five. These young adults are the products of the school system of the 1960's.

Taking a look closer to home, we see that some North American schools are also trying to meet the needs of individual students through various physical setups and modes of instruction. An example of a Canadian school which is trying to meet student-expressed needs is the Everdale Place in Ontario.

> . . . the emphasis is on freedom for healthy psychological growth, not just self-directed study, but self-actualization. Students take part in all decisions concerning themselves, rules are minimized, and students attend only those classes they wish to.[1]

Another Canadian example is a student-established and student-run school in Vancouver, British Columbia, called Knowplace.[2] Since the students have a say in running Knowplace, it therefore is an example where student self-expressed needs are taken into consideration.

The late 1950's, the 1960's and 1970's have had school settings, methods of instruction, and programs such as: team teaching, contracts, open areas, programmed instruction, self-pacing independent study, and individualized education--all trying to meet student needs in North America. The above-mentioned programs are, after all, designed for the student. Surely these programs would not have originated in our schools if educators had believed that student needs

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[1]Gibbons, op. cit., p. 8.

[2]Ibid., p. 39.

in education were being met without them.

Team teaching and co-operative teaching which was rediscovered in the late 1950's worked on the concept that a group of teachers, working together, would be better able to meet a student's needs and interests, rather than one teacher alone. The team's talents pooled together would be able to offer the student a greater diversity and variety of knowledge, different personalities to work with, and presentation methods.

The use of the discovery method of teaching science came into the schools in the late 1950's and early 1960's. Using this method the teacher presented a printed manual on the procedural instructions for the discovery of the unstated concepts and provided all the equipment necessary for each student to discover the concept himself.[1]

The Ford Foundation has spent large sums of money on research on programmed learning using learning machines and television. These methods of presentation of the material to be learned were directed to stimulate students' interests and to fulfil their needs with respect to learning.

Contract teaching which was at the height of its popularity in North American schools in the mid 1960's is another method of instruction which tries to fulfil students' needs. Contract teaching is a form of individualized education. It allows a student to have some say in the type of materials he wishes to take up and is capable of doing.

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[1] Babikian, op. cit., pp. 201-202.

According to Heathers

> Individualized education consists of planning and conducting, with each student, general programs of study and day-to-day lessons that are tailor-made to suit his learning needs and his characteristics as a learner.[1]

The characteristics and learning needs of the learner are self-expressed.

According to J.V. Edling's model of individualized education: When the school selects both the learning objectives and the media, the category is termed Individually Diagnosed Prescribed Learning. When the school determines what is learned but allows the learner some freedom in determining how he will achieve the objectives, the category is called Self-Directed Learning. When the learner selects the objectives, but the media is determined by the school, the category is termed Personalized Learning. When the student selects both what is to be learned and ways to learn it, the process is termed Independent Study.[2] In independent study the student pursues his interests by various means such as: going to the library or laboratory, watching films and filmstrips, listening to tapes, and doing projects on his own.

Different versions of individualized education programs have been established in order to try to fulfil students' needs and interests. The Winnetka School Plan under Carleton Washburne divided

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[1]U.S., Department of Health, Education, and Welfare, U.S. Office of Education, A Definition of Individualized Education (ERIC Document Reproduction Service, ED 050012, July 1971), p. 1.

[2]Jack V. Edling, Individualized Instruction: A Manual for Administrators (Corvallis, Oregon: Oregon State University, Department of Printing, 1971), p. 2.

the curriculum into two parts. One part consisted of the "tool" subjects (arithmetic, reading, and the language arts). These were taught by dividing the curriculum into units of achievement that all students were required to master. The other half of the Winnetka Plan consisted of creative activities such as drama, music, clubs, electives, the practice of citizenship and democracy, physical education, and school assemblies. These activities were to give the child room to exercise his special needs and talents. The child was also required to co-ordinate his special interests with those of others toward a common end.[1]

In 1963 a joint effort to develop a system of Individually Prescribed Instruction (IPI) was begun by the Learning Research and Development Centre, at the University of Pittsburg and the Baldwin-Whitehall Public Schools of suburban Pittsburg. A K-6 grade level school, Oakleaf, was chosen as the experimental site. Presently the field testing and dissemination of IPI are the responsibilities of Research for Better Schools, Philadelphia.[2]

During the period of 1965-71 the Wisconsin Research and Development Centre for Cognitive Learning and co-operating educational agencies developed a system of individually guided education (IGE) at the elementary school level. One of the components of the organizational-administrative component was called the multi-unit elementary

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[1]Gibbons, op. cit., p. 44.

[2]Robert Weisgerber, ed., Developmental Efforts in Individualized Learning (Itasca, Ill.: F.E. Peacock Publishers, Inc., 1971), p. 91.

school (MUS-E). The MUS-E was selected for statewide demonstration and installation in the 1968-69 school year. The Department of Health, Education, and Welfare and the Office of Education selected the MUS-E for nationwide installation starting in the 1971-72 school year. It is considered to be the first realistic alternative to the age-graded, self-contained classroom organization for instruction.[1]

Thirteen school districts from California, Massachussetts, New York, Pennylvania, and West Virginia joined with the American Institutes for Research and Learning and the Westinghouse Learning Corporation in February 1967, to begin a four year project called a Program for Learning in Accordance with Needs (PLAN). An individualized learning system spanning grades one to twelve in the subject areas of language arts, science, social studies, and mathematics was undertaken. The basic research and development for PLAN has been completed by 1970 and the individualized system has become a reality in the four disciplines at all twelve grade levels. By the end of 1970 PLAN was in active use in some seventy-two locations.

Project PLAN recognized that the long range goals of individuals showed considerable variety, just as did abilities, interests, and levels of achievement. This variation was to be accommodated by a systematic reorganization of currently available learning material into modular form, thus making educational experiences more meaningful.[2]

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[1] Ibid., "Introduction", pp. 2-3.

[2] Ibid.

In some areas studies have been conducted which involved students for the purpose of better curriculum design.

> In order to help the college better identify and meet the needs of current and potential students, additional exploration should include the following:
>
> 1. Further studies of present student subgroups, to focus upon reasons for success (and non-success), personal goals, and special student needs.[1]

> A great attempt was made to direct the school program so that it would be much more student-centered. Numerous meetings were held with students, teachers, administrators, and vocational staff people to determine the interests and needs of our student body.[2]

> Yet as almost all educators agree, an essential step for individual development is the growth of self-esteem and dignity that comes from participating in a valued social context.[3]

The Core Report on curriculum implementation which was designed to meet individual student's needs and interests was to be implemented in Manitoba schools as of September 1975.[4] In the program,

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[1] Harrisburg Area Community College, Meeting the Changing Needs of Students. A Profile of Students (Pa.: ERIC Document Reproduction Service, ED 038139, Feb. 1970), p. 20.

[2] Lucille L. Santo, Coordination of Organic Curriculum Development in the Public Schools of San Antonio, Texas (Edgewood Independent School District, San Antonio, Texas: ERIC Document Reproduction Service, ED 047410, Nov. 1970), p. 4.

[3] Ibid., p. 12.

[4] Manitoba Department of Youth and Education, Report of the Core Committee on the Reorganization of the Secondary School, 1973, pp. 9-24.

to fulfil individual student's needs which may relate to the community in which he lives, a student may include among the free electives necessary for graduation up to three credits for programs or projects that he himself has initiated and which the school, within the parameters of departmental guidelines, is prepared to approve and supervise for credit purposes.[1]

At present a number of schools in Manitoba are engaged in student-initiated courses for credit purposes.[2]

The Manitoba Department of Education in conjunction with the University of Manitoba and the Winnipeg School Division set up a teacher training program oriented to the needs of students in the inner city.[3]

The late 1950's saw the beginning of a trend in American education which was directed at trying to meet the needs of individual students. During the 1960's this trend accelerated. At present, in the 1970's, educators and teachers are not only trying to meet students' needs but, in addition, they are also trying to develop programs which would allow students to come forward and identify some of these needs. This present study will try to contribute to this cause.

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[1]Manitoba, Department of Education, Education Manitoba, December 1974, p. 11.

[2]Manitoba, Department of Education, Education Manitoba, March 1975, p. 2.

[3]Manitoba, Department of Education, Bulletin, March 1974, p. 1.

Summary

The review of the literature consisted of two parts. The first part looked at the advantages and the disadvantages of using student self-expressed needs for purposes of curriculum development. Evidence from various studies indicate that the curriculum needs differ in accordance with various social communities. There is supporting evidence that in many instances the students realize what their needs are. However, one must be careful that curriculum planning and implementation is not passed on from the hands of the educator into the hands of the student and the layman within the community. If this should take place, it would be like the patient telling the doctor what his ailment is and then telling the doctor what cure to prescribe.

The second part was a resumé of the various projects and programmes that have been tailored for today's student. If these programs are flexible enough, such as the core program, then they will probably meet some of the specific needs of students within a particular community. However, in many instances, the programmes have not been implemented due to the lack of resources within that particular community.

To the author's knowledge there has been no specific research in Manitoba to identify the self-expressed needs of middle school children with respect to science education.

Chapter III will discuss the design of the study.

CHAPTER III

DESIGN OF THE STUDY

This chapter will discuss the design of the study as well as the development and implementation of the data-gathering instrument. The chapter will include criteria for selecting the samples, and a description of the procedures that were followed in designing and administrating the questionnaire.

Prior to the study, the school authorities were approached and advised of the nature of the study. Application was made to the Inter University Research Committee to get permission to go into the Winnipeg schools in Winnipeg School Division No. 1 to conduct the study. The Inter University Research Committee granted the writer permission to conduct the study. Mr. M.R. Smith, assistant superintendent of the Winnipeg School Division No. 1 gave the writer a letter of introduction (Appendix B) which gave permission to proceed with the study. This letter was presented to the principal of each school.

The principals and the school staff were under no obligation to take part in the study. Their involvement was entirely voluntary and the writer is extremely grateful.

The study consisted of two problems. The first problem and related questions follow - to identify and compare a number of self-expressed needs in science of low achieving and other junior high students in inner city schools with respect to:

(a) The learning environment

(b) Methods of instruction

(c) Attitudes toward science

  (i) present

  (ii) past

  (iii) and future

(d) Science curriculum

(e) Opinions of science

The following questions were formulated with respect to Problem One. They consist of questions one to four which are of the information-getting type and questions five to nine which include a null hypothesis to be tested by the study.

For questions one to four the following criterion was used for the identification of a need.

If 50 percent or more of the students of any particular group in the study express a definite opinion as to agree or disagree for a particular item of the questionnaire, then a need is identified for that particular group.

Questions Relative to Problem One

1. What are the self-expressed needs of junior high students from inner city schools in terms of the categories listed in Problem One?
2. How do the self-expressed needs of junior high students from inner city schools who are low achievers differ from other students in terms of the categories listed in Problem One?

3. What are the self-expressed needs of junior high students from inner city schools who are low achievers in terms of the categories listed in Problem One?
4. How do the self-expressed needs of junior high students from inner city schools who are low achievers differ for grades 7, 8, and 9 in terms of the categories listed in Problem One?
5. How do the self-expressed needs of male junior high students from inner city schools who are low achievers differ from others as per the five categories listed in Problem One?

Ho 1: There is no difference between the male low achievers and male others with respect to each of the questionnaire items.

6. How do the self-expressed needs of female junior high students from inner city schools who are low achievers differ from others in the five categories listed in Problem One?

Ho2: There is no difference between the female low achievers and female others with respect to each of the questionnaire items.

7. How do the self-expressed needs of junior high students from inner city schools who are grade 7 low achievers differ from other grade 7 students in terms of the five categories listed in Problem One?

Ho 3: There is no difference between the grade 7 low achievers and other grade 7 students with respect to each of the questionnaire items.

8. How do the self-expressed needs of junior high students from inner city schools who are grade 8 low achievers differ from

other grade 8 students in terms of the five categories listed in Problem One?

Ho 4: There is no difference between the grade 8 low achievers and other grade 8 students with respect to each of the questionnaire items.

9. How do the self-expressed needs of junior high students inner city schools who are grade 9 low achievers differ from other grade 9 students in terms of the five categories listed in Problem One?

Ho 5: There is no difference between the grade 9 low achievers and other grade 9 students with respect to each of the questionnaire items.

Problem Two of the study is as follows: to determine the relationship between the student "likes" of selected elements of the learning environment and their perceptions of learning with respect to these elements.

The following questions apply to Problem Two.

Questions Relative to Problem Two

1. What is the relationship between likes and learning for all students in the sample?
2. What is the relationship between likes and learning for low achievers in the sample?
3. What is the relationship between likes and learning for other students in the sample?

The Design of the Instrument

A preliminary search questionnaire (Appendix C) was devised by the author to get opinions from students on what their needs might be. These opinions were then used in designing the main questionnaire (Appendix A).

The writer went to Gordon Bell High School to conduct interviews with junior high students with questions from the preliminary search questionnaire. The students were approached by the writer in the halls and various classrooms and asked if they wished to answer questions in a taped interview. The student was told that the taped interview was completely voluntary on his or her part and the responses would be kept confidential. Since many of the students knew the writer, most consented.

Taped interviews were conducted with sixteen grade eight students and thirty-four grade nine students from Grodon Bell High School. These students were arbitrarily selected from the school population.

Later when the writer checked the Kardex files of these fifty students, it was found that sixteen were in the category classed as low achievers. Of these sixteen low achievers, seven were in grade eight and nine in grade nine.

Using the responses to the preliminary search questionnaire (Appendix C) and other suggestions from the fifty students with whom the writer conducted taped interviews, a main questionnaire was constructed (Appendix A). This main questionnaire consisted of sixty-five positive statements. To each of these statements, the subject was to give one of three responses: agree, undecided, or disagree. If a subject did not give any response to a particular statement, that statement was scored as "undecided". There were three subjective questions at the end of the questionnaire.

The sixty-five positive statements in the main questionnaire fell into five categories. Statements 1, 2, 9, 10, 14, 15, 18, 19, 20, 21, 43, 44, 51-53, 54, 56, 57, 59, and 60 referred to the learning environment. Statements 3-8, 16, 17, 22, 23, 45-50, 55, 58, 61, and 62 referred to methods of instruction. Statements 11-13, 24, and 63-65 referred to general attitudes toward science--present, past, and future. Statements 25 to 39 referred to the science curriculum content. Finally statements 40-42 referred to the students' opinions about science.

The writer considered using the Likert[1] scale for the mode of response. However, this scale gives the subject a multiplicity of choices for his response. Since the subjects were of junior high age, the Likert scale may have created more hesitancy and conflict in the

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[1]Marvin E. Shaw and Jack M. Wright, Scales for the Measurement of Attitudes (Toronto: McGraw-Hill, Inc., 1967), pp. 72-194.

subjects while trying to decide where the correct response would be. This in turn would have increased the time required to answer the questionnaire.

Instead, an LID[1] attitude scale was used. It consisted of a three choice response: agree, undecided, disagree. This scale limited the number of choices confronting the subject to three and was less time consuming.

Administration of the Questionnaire

The writer administered the questionnaire with the consent of the school principals and with the help and consent of the classroom teachers.

The administration and answering of the questionnaire was completely voluntary on the part of the staff and the students. A few students objected to answering the questionnaire, and these students were excused.

The subjects who answered the questionnaire remained anonymous. They were required only to indicate their sex and grade. The criteria used to select the low achievers was based on the teachers' opinions and the Otis I.Q. score. In some schools the teachers involved in the survey gave the writer lists of the names of those students whom they considered to be low achievers. The names on these lists were then researched by the writer in the Kardex files to see if their I.Q.'s were 90 or above as scored on the Otis.....Those students with I.Q.'s less than 90 were not classed as low achievers. In one school the writer simply picked out the students with I.Q.'s above 90 who

[1] D.K. Perry, "Forced-Choice vs. L.I.D. Response Items in Vocational Interest Measurement", Journal of Applied Psychology 39 (1955):256.

were getting low marks in science and classed them as low achievers.

At the beginning of each survey the low achievers in each classroom were given coded questionnaires. The classroom teacher gave out the questionnaires. All the students in each class received a questionnaire with the exception of the few who objected to answering one. The writer then gave the instructions and answered any questions which arose.

The rooms were arbitrarily selected from the five inner city schools which participated in the survey.

Table A on page 53 shows the breakdown of the population sampled according to schools, grades, sex, and classification as to low achievers or others.

Scoring

The responses from the nine hundred and forty-four subjects were scored. All unanswered questions were scored as "undecided". The raw scores were converted to percentage scores and weighted scores. The weighted scores were derived by assigning a score of (+1) for "agree", (0) for "undecided", and (-1) for "disagree". These scores are available from the author.

The responses from the nine hundred and forty-four subjects were put on key punch computer cards. Each subject was coded with respect to grade, sex, school, and whether a low achiever or other student.

Treatment of data for Problem One was as follows: A Statistical Package for the Social Sciences SPSSH-Version 6.01 program was

TABLE A

THE BREAKDOWN OF THE TOTAL STUDENT POPULATION SAMPLED IN TERMS OF GRADE, SEX, SCHOOL, LOW ACHIEVERS AND OTHER STUDENTS

	GRADE VII				GRADE VIII				GRADE IX				
SCHOOLS / CLASSIFICATION	GIRLS LOW ACHIEVERS	BOYS LOW ACHIEVERS	GIRLS OTHERS	BOYS OTHERS	GIRLS LOW ACHIEVERS	BOYS LOW ACHIEVERS	GIRLS OTHERS	BOYS OTHERS	GIRLS LOW ACHIEVERS	BOYS LOW ACHIEVERS	GIRLS OTHERS	BOYS OTHERS	TOTALS
ABERDEEN	8	7	10	7	1	2	12	21	6	2	5	8	89
GENERAL WOLFE	5	6	22	21	3	9	24	14	2	7	27	23	163
GORDON BELL	12	15	56	50	22	29	27	34	16	14	73	45	393
ST. JOHNS	1	4	27	35	4	7	23	15	4	8	25	19	172
SISLER	3	6	20	28	2	4	14	18	3	6	11	12	127
TOTALS	29	38	135	141	32	51	100	102	31	37	141	107	944

used. A cross tabulation of percentage scores, and a comparison for significant difference between low achievers and other students was made for each of the sixty-five items in the questionnaire with respect to male and female for each grade and for each of the five schools sampled.

The treatment of data for Problem Two was as follows: The correlation coefficients between likes and learning for the three questions expressed in Problem Two were obtained by means of the Statistical Package for the Social Sciences SPSSH-Version 6.01 to a .001 level of significance.

A correlation was done between items which represented "likes" and those which represented "learning" in the main questionnaire. The "likes" items in the questionnaire consisted of 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 14, 15, 16, 17, 18, 19, 20, 21, 22, and 23, while the parallel items which corresponded to "learning" were 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 58, 56, 57, 59, 60, 61, 62.

Summary

This chapter consists of Problems One and Two and questions for Problems One and Two, the design of the instrument, a table describing the study population, and the description of the study. Chapter IV consists of data and its interpretation and a brief interpretation of each table with respect to the questions to be answered.

CHAPTER IV

INTERPRETATION OF DATA

Introduction

This chapter consists of the questionnaire data and its interpretation. Tables I(a) to (e), II(a) to (e), III(a) to (e) and IV(a) to (e) consist of number and percentage scores of responses to "agree", "undecided", and "disagree" to items 1 to 65 of the main research questionnaire. Tables I(a) to (e) present information for question 1 of Problem One. Tables II(a) to (e) have information which deals with question 2 of Problem One. Tables III(a) to (e) provide information for question 3 of Problem One while Tables IV(a) to (e) present data for question 4 of Problem One.

Tables V(a) to (e) and VI(a) to (e) contain the degree of significant difference data. The figures in Table V(a) to (e) and VI(a) to (e) provide data for questions 5 to 9 of Problem One.

Tables VII, VIII, and IX consist of number and percentage scores in comparing likes and learning. Tables VII, VIII, and IX provide data for questions 1 to 3 of Problem Two.

Tables X, XI, and XII consist of correlation coefficients and provide data for questions 1, 2, and 3 of Problem Two.

Data was collected by means of the main questionnaire and put in table form. Tables I(a) to IV(a) are used to answer questions 1 to 4 with respect to the learning environment which is designated by items 1, 2, 9, 10, 14, 15, 18, 19, 20, 21, 43, 44, 51-53, 54, 56, 57, 59, and 60 of the main research questionnaire. These refer to subparts of Problem One. These items are listed in Tables I(a) to IV(a). The data is given in student numbers and percentages. From this data the writer was able to determine the self-expressed needs with respect to the learning environment.

Tables I(b) to IV(b) are used to answer questions 1 to 4 with respect to the methods of instruction which is designated by items 3-8, 16, 17, 22, 23, 45-50, 55, 58, 61, and 62 of the main research questionnaire. These items are listed in Tables I(b) to IV(b). The data is expressed in student numbers and percentages. From this data the writer was able to determine the self-expressed needs of junior high students with respect to the methods of instruction.

Tables I(c) to IV(c) are used to answer questions 1 to 4 with respect to attitudes toward science which is expressed by items 11-13, 24, and 63-65 of the main questionnaire. These items are listed in Tables I(c) to IV(c). The data is expressed in student numbers and percentages. From this data the writer was able to determine the self-expressed needs of junior high students with respect to attitudes toward science.

Tables I(d) to IV(d) are used to answer questions 1 to 4 with respect to the science curriculum content. This is represented by items 25 to 39 of the main questionnaire. These items are listed in Tables I(d) to IV(d). The data is given in student numbers and percentages. From this data the writer was able to determine the self-expressed needs of junior high students with regard to the science curriculum content.

Tables I(e) to IV(e) are used to answer questions 1 to 4 with respect to the opinions about science of junior high students. This is designated by items 40-42 of the main questionnaire. These items are listed in Tables I(e) to IV(e). The data is expressed in student numbers and percentages. From this data the writer was able to determine the self-expressed opinions about science by junior high students.

Table V(a) is used to answer questions 5-9 with respect to the learning environment which is designated by items 1, 2, 9, 10, 14, 15, 18, 19, 20, 21, 43, 44, 51-53, 54, 56, 57, 59, and 60 on the main research questionnaire. These items are listed in Table V(a). The data is expressed in significant difference between low achievers and other students with respect to male and female. Table VI(a) does the same for each of grades 7, 8, and 9.

Table V(b) is used to answer questions 5-9 with respect to methods of instruction which is designated by items 3-8, 16, 17, 22, 23, 45-50, 55, 58, 61, and 62 of the main research questionnaire. These items are listed in Table V(b). The data are expressed in significant difference between low achievers and other students in terms of male and female. Table VI(b) does this in terms of grades 7, 8, and 9.

Table V(c) is used to answer questions 5-9 with respect to attitudes toward science which is expressed by items 11-13, 24, and 63-65 of the main research questionnaire. These items are listed in Table V(c). The data is expressed in significant difference between low achievers and other students with respect to male and female. Table VI(c) does this in terms of grades 7, 8, and 9.

Table V(d) is used to answer questions 5-9 in Problem Two with respect to the science curriculum content. This is represented by items 25 to 39 of the main questionnaire. These items are listed in Table V(d). The data is given in significant difference between low achievers and other students with respect to male and female. Table VI(d) does this for each of grades 7, 8, and 9.

Table V(e) is used to answer questions 5-9 with respect to opinions about science by junior high students. This is designated by items 40-42 of the main questionnaire. These items are listed in Table V(e). The data is expressed in significant difference between low achievers and other students with respect to male and female. Table VI(e) shows this for each of grades 7, 8, and 9.

Part I - Questions One to Four

Part I of this chapter will consist of interpretation of data for questions 1 to 4 as posed in Problem One, that is, to identify and compare a number of self-expressed needs in science of low achieving and other junior high students in inner city schools with respect to: the learning environment, methods of instruction, attitudes toward science, science curriculum content, and opinions with respect to science.

Question One

Data in Tables I(a) to (e) provide information for question 1 posed in Problem One. What are the self-expressed needs of junior high students from inner city schools with respect to: the learning environment, methods of instruction, attitudes toward science, science curriculum content, and opinions with respect to science?

The questions looked at are only those which meet the fifty percent criterion for a need.

Table I(a) shows that the entire student sample expressed a need for items 9, 10, 21, 43, and 51 with respect to the learning environment. Of the 944 students sampled, 88.1 percent replied "agree" for item 9, 61.3 percent for item 10, 61.2 percent for item 21, 58.3 percent for item 43, and 73.8 percent for item 51 of the questionnaire. All of these responses were above the 50 percent criteria set in Chapter III. In addition, 72.4 percent of the entire population sampled disagreed with item 20.

A need is indicated for field trips posed in item 9 and having 88.1 percent of the entire sample answering "agree". There is a lesser need to work in the library by 61.3 percent as shown in item 10. There appears to be a negative need of a strict teacher in item 20 of which 72.4 percent replied with "disagree", 58.3 percent indicated that they learned best in a regular classroom, item 43, while 73.8 percent indicated that they learned best on field trips, item 51.

For item 20 - 72.4 percent, and 59 - 50.6 percent indicated "disagree" with liking and learning in the presence of a strict teacher.

TABLE Ia

NUMBER AND PERCENTAGE SCORES FOR THE SELF-EXPRESSED NEEDS OF JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS WITH RESPECT TO THE LEARNING ENVIRONMENT

(N = 944 STUDENTS)

ITEM	AGREE		UNDECIDED		DISAGREE	
NUMBER	NO	%	NO.	%	NO.	%
1	495	52.4	205	21.7	244	25.9
2	350	37.1	233	24.7	361	38.2
9	832	88.1	86	9.1	26	2.8
10	579	61.3	219	23.2	146	15.5
14	307	32.5	411	43.5	226	24.0
15	275	29.1	408	43.2	261	27.6
18	312	33.1	478	50.6	154	16.3
19	191	20.2	530	56.2	223	23.6
20	80	8.5	180	19.1	684	72.4
21	578	61.2	209	22.1	157	16.7
43	550	58.3	221	23.4	173	18.3
44	234	24.8	292	30.9	418	44.3
51	697	73.8	176	18.6	71	7.5
52	438	46.4	256	27.1	250	26.5
53	222	23.5	489	51.8	233	24.7
54	218	23.1	493	51.2	233	24.7
56	301	31.9	474	50.2	169	17.9
57	152	16.1	546	57.8	246	26.1
59	214	22.6	253	26.8	477	50.6
60	403	42.7	283	30.0	258	27.3

Table I(b) shows the needs of all junior high students with respect to methods of instruction. Item 3 - 54.5 percent and item 45 - 56.7 percent indicate a need for both liking and learning with the teacher presenting his lessons in front of the classroom. This was indicated by the entire student sample.

Item 6 - 72.8 percent and item 48 - 71.7 percent indicate a need for class discussions with teacher and students taking part. There is a positive response - 72.8 percent for liking and 71.7 percent for learning respectively in this pair of items. Item 8 - 78.8 percent and item 50 - 62.5 percent establish a need for liking and learning with regard to film strips. Items 17 - 73.4 percent and 58 - 69.1 percent show that the students expressed a need for liking to do experiments on their own as well as learning from student participation in experiments. Items 23 - 73.0 percent and 62 - 69.3 percent indicate a need for the teacher to go around the room helping students as well as providing a good learning environment by this method of instruction.

In Table I(c) 82.6 percent of the nine hundred and forty-four (944) students indicated a need for tests with positive results which encourage students as indicated in item 24. In item 63 - 54.6 percent of the students indicated that their science course was not too difficult to read and follow. In item 64 - 62.2 percent of the students indicated that they understood most of the ideas in their science course. Results from items 63 and 64 would then indicate that there is no need to further simplify the junior high science courses.

TABLE Ib

NUMBER AND PERCENTAGE SCORES FOR THE SELF-EXPRESSED NEEDS OF JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS WITH RESPECT TO THE METHODS OF INSTRUCTION

(N = 944 STUDENTS)

ITEM NUMBER	AGREE		UNDECIDED		DISAGREE	
	NO.	%	NO.	%	NO.	%
3	515	54.5	218	23.1	211	22.4
4	232	24.6	298	31.6	414	43.8
5	330	35.0	250	26.5	364	38.5
6	687	72.8	146	15.5	111	11.7
7	387	41.0	294	31.1	263	27.9
8	744	78.8	137	14.5	63	6.7
16	453	48.0	190	20.1	301	31.9
17	693	73.4	142	15.1	109	11.5
22	299	31.7	203	21.5	442	46.8
23	689	73.0	181	19.2	74	7.8
45	535	56.7	233	24.7	176	18.6
46	209	22.1	337	35.7	398	42.2
47	376	39.8	291	30.8	277	29.4
48	677	71.7	146	15.5	121	12.8
49	427	45.2	282	29.9	235	24.9
50	590	62.5	217	23.0	137	14.5
55	421	44.6	236	25.0	287	30.4
58	652	69.1	185	19.6	107	11.3
61	231	24.5	289	30.6	424	44.9
62	654	69.3	191	20.2	99	10.5

TABLE Ic

NUMBER AND PERCENTAGE SCORES FOR THE SELF-EXPRESSED NEEDS OF JUNIOR HIGH STUDENTS FROM THE INNER CITY SCHOOLS WITH RESPECT TO THE GENERAL ATTITUDES TOWARD SCIENCE

(N = 944 STUDENTS)

ITEM NUMBER	AGREE		UNDECIDED		DISAGREE	
	NO.	%	NO.	%	NO.	%
11	432	45.8	328	34.8	184	19.4
12	448	47.5	202	21.5	294	31.0
13	365	38.6	382	40.5	197	20.9
24	780	82.6	112	11.9	52	5.5
63	142	15.0	287	30.4	515	54.6
64	587	62.2	235	24.9	122	12.9
65	282	29.9	254	26.9	208	22.0

Table I(d) shows that 74.2 percent show a need for item 25, learning about living things (biology), 60.4 percent show a need for learning about sun, stars, moon, etc., indicating a need for astronomy at the junior high level. In item 30 - 52.8 percent showed a need for chemistry and chemicals, in item 31 - 50.3 percent showed a need for knowing more about motors, while 56.6 percent indicated an interest in fossils as per item 32. Item 34 indicated 57.9 percent "agree" to a need for materials about nutrition at the junior high level. There was a percentage of 57.6 agreeing that there is a need for a course on the environment as suggested in item 39.

Of the nine hundred and forty-four (944) students sampled, 52.1 percent replied "agree" that science would be of use to them after they leave school as indicated in item 41 of Table I(e). This would indicate that junior high students feel that there is a need for a compulsory science course in the curriculum. Only 33.3 percent of the students stated that science should be made optional at the junior high level as indicated by item 42 of Table I(e).

Question Two

Tables II(a) to II(e) provide data for question 2 of Problem One. How do the self-expressed needs of junior high students from inner city schools who are low achievers differ from other junior high students with respect to the learning environment, methods of instruction, attitudes toward science, science curriculum content, and opinions about science? The sample consists of two hundred and

TABLE Id

NUMBER AND PERCENTAGE SCORES FOR THE SELF-EXPRESSED NEEDS OF JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS WITH RESPECT TO THE SCIENCE CURRICULUM CONTENT

(N = 944 STUDENTS)

ITEM NUMBER	AGREE		UNDECIDED		DISAGREE	
	NO.	%	NO.	%	NO.	%
25	700	74.2	162	17.2	82	8.6
26	434	46.0	229	24.3	281	29.7
27	387	41.0	275	29.1	282	29.9
28	570	60.4	194	20.5	180	19.1
29	406	43.0	247	26.2	291	30.8
30	498	52.8	198	21.0	248	26.2
31	475	50.3	199	21.1	270	28.6
32	534	56.6	228	24.2	182	19.2
33	440	46.6	295	31.2	209	22.1
34	547	57.9	242	25.7	155	16.4
35	450	47.7	280	29.7	214	22.6
36	265	28.1	314	33.3	365	38.6
37	393	41.6	303	32.1	248	26.3
38	354	37.5	280	29.7	310	32.8
39	544	57.6	254	26.9	146	15.5

TABLE Ie

NUMBER AND PERCENTAGE SCORES FOR THE SELF-EXPRESSED NEEDS OF JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS WITH RESPECT TO OPINIONS ABOUT SCIENCE

(N = 944 STUDENTS)

ITEM NUMBER	AGREE NO.	AGREE %	UNDECIDED NO.	UNDECIDED %	DISAGREE NO.	DISAGREE %
40	433	45.9	243	25.7	268	28.4
41	492	52.1	249	26.4	203	21.5
42	314	33.1	216	22.9	414	43.8

eighteen (218) low achievers and seven hundred and twenty-six (726) other students.

Only those questions which meet the 50 percent criterion for a need are looked at in Tables II(a) to (e).

Results in Tables II(a) show that 50.9 percent of low achievers and 52.9 percent of other students replied "agree" to item 1, which is a regular classroom environment. This would indicate a definite need to maintain regular size classrooms in our schools. In addition, both the low achievers, 53.2 percent, and the other students, 59.8 percent, indicated that they learn best when taught in a regular classroom as per item 43.

In item 9, both low achievers, 89.9 percent and the other students, 87.6 percent, indicated a need for field trips. Both low achievers, 78.4 percent and the other students, 72.5 percent, indicated a good learning situation on field trips as posed by item 51 of the main

TABLE IIa

COMPARISON OF NUMBER AND PERCENTAGE SCORES FOR SELF EXPRESSED NEEDS OF JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS BETWEEN THE LOW ACHIEVERS AND OTHER STUDENTS WITH RESPECT TO THE LEARNING ENVIRONMENT

	LOW ACHIEVERS (N = 218 STUDENTS)						OTHER STUDENTS (N = 726 STUDENTS)					
	AGREE		UNDECIDED		DISAGREE		AGREE		UNDECIDED		DISAGREE	
ITEM NUMBER	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
1	111	50.9	38	17.4	69	31.7	384	52.9	167	23.0	175	24.1
2	95	43.6	49	22.5	74	33.9	255	35.1	184	25.3	287	39.6
9	196	89.9	15	6.9	7	3.2	636	87.6	71	9.8	19	2.6
10	150	68.8	43	19.7	25	11.5	429	59.1	176	24.2	122	16.7
14	78	35.8	95	43.6	45	20.6	229	31.5	316	43.5	181	25.0
15	56	25.6	89	40.8	73	33.6	219	30.2	319	43.9	188	25.9
18	74	33.9	98	45.0	46	21.1	238	32.8	380	52.3	108	14.9
19	56	25.6	105	48.2	57	26.1	135	18.6	425	58.5	166	22.9
20	17	7.8	31	14.2	170	78.0	63	8.7	149	20.5	514	70.8
21	152	69.7	34	15.6	32	14.7	426	58.7	175	24.1	125	17.2
43	116	53.2	55	25.2	47	21.6	434	59.8	166	22.9	126	17.3
44	69	31.6	66	30.3	83	38.1	165	22.7	226	31.1	335	46.2
51	171	78.4	29	13.3	18	8.3	526	72.5	147	20.2	53	7.3
52	114	52.3	54	24.8	50	22.9	324	44.6	202	27.8	200	27.6
53	61	28.0	102	46.8	55	25.2	161	22.2	388	53.3	178	24.5
54	47	21.6	104	47.7	67	30.7	171	23.5	389	53.6	166	22.9
56	68	31.2	109	50.0	41	18.8	233	32.1	365	50.3	128	17.6
57	37	17.0	125	57.3	56	25.5	115	15.8	421	58.0	190	26.2
59	43	19.7	44	20.2	131	60.1	171	23.5	209	28.8	346	47.7
60	112	51.4	55	25.2	51	23.4	291	40.1	228	31.4	207	28.5

research questionnaire.

Item 10, of which 68.8 percent of the low achievers and 59.1 percent of the other students agreed to, indicated a need for library use. In item 52, 52.3 percent of the low achievers indicated that there was a good learning situation in library use. In item 10, 59.1 percent of the other students indicated that they liked working in the library, while only 44.6 percent of the other students replied "agree" when posed with the question of whether they learned best in the library as in item 52.

This is below the 50 percent criterion set in Chapter III. This poses a question of whether the low achievers really learn in the library on their own, or whether they think that they learn in the library because they like being there.

In item 21, both low achievers, 69.7 percent and the other students, 58.7 percent, indicate that they like an easy going teacher. In item 60, only the low achievers, 51.4 percent, are above the 50 percent criteria in agreeing that they learn best with an easy going teacher. It may well be that the low achievers feel they learn best in an environment they like, or that less is demanded of them by an easy going teacher, and so they feel that they learn best in this situation.

In item 20, 78.0 percent of the low achievers and 70.8 percent of the other students indicated that they disliked a strict teacher. On the other hand, only the low achievers, 60.1 percent in item 59 indicated that they did not learn well with a strict teacher. Even though 70.8 percent of the other students in item 20 indicated that they disliked a strict teacher, only 47.7 percent indicated that their learning was hampered by a strict teacher in item 59 which is below the 50 percent criteria.

Item 3 of Table II(b) indicates a need for regular traditional lessons by the teacher by both the low achievers, 53.7 percent and the other students, 54.8 percent. Item 45 indicates that both groups feel that they learn well from this mode of instruction, 52.2 percent for low achievers and 57.7 percent for the other students.

Item 6 of Table II(b) indicates a need for class discussions by teacher and students, 74.3 percent of the low achievers and 72.3 percent of the other students replied in the affirmative to this question. Both the low achievers - 69.3 percent and the other students 72.5 percent, responded that science was learned best with classroom discussions as posed in item 48.

Data from item 8 of Table II(b) indicates a need for filmstrips and films, low achievers 85.3 percent and the other students 76.9 percent. Both groups indicated that they learned well by means of filmstrips and film in item 50, low achievers 72.5 percent, and 59.5 percent of other students.

Neither group surpassed the 50 percent criteria set in Chapter III to item 7 of Table II(b), liking science best in small group discussions, low achievers 41.7 percent and the other students, 40.8 percent. The low achievers, for some reason, replied that they learned science best in small group discussions, 50.5 percent as shown by item 49 of Table II(b).

TABLE IIb

COMPARISON OF NUMBER AND PERCENTAGE SCORES FOR SELF EXPRESSED NEEDS OF JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS BETWEEN THE LOW ACHIEVERS AND OTHER STUDENTS WITH RESPECT TO THE METHODS OF INSTRUCTION

ITEM NUMBER	LOW ACHIEVERS (N = 218 STUDENTS)						OTHER STUDENTS (N = 726 STUDENTS)					
	AGREE		UNDECIDED		DISAGREE		AGREE		UNDECIDED		DISAGREE	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
3	117	53.7	55	25.2	46	21.1	398	54.8	163	22.5	165	22.7
4	65	29.8	56	25.7	97	44.5	167	23.0	242	33.3	317	43.7
5	71	32.6	54	24.8	93	42.6	259	35.7	196	27.0	271	37.3
6	162	74.3	27	12.4	29	13.3	525	72.3	119	16.4	82	11.3
7	91	41.7	56	25.7	71	32.6	296	40.8	238	32.8	192	26.4
8	186	85.3	21	9.6	11	5.1	558	76.9	116	16.0	52	7.1
16	111	50.9	42	19.3	65	29.8	342	47.1	156	21.5	236	32.4
17	150	68.8	39	17.9	29	13.3	543	74.8	103	14.2	80	11.0
22	79	36.2	42	19.3	97	44.5	220	30.3	161	22.2	345	47.5
23	169	77.5	33	15.1	16	7.4	520	71.6	148	20.4	58	8.0
45	116	53.2	62	28.4	40	18.3	419	57.7	171	23.6	136	18.7
46	60	27.5	64	29.4	94	43.1	149	20.5	273	37.6	304	41.9
47	85	39.0	61	28.0	72	33.0	291	40.1	230	31.7	205	28.2
48	151	69.3	42	19.3	25	11.4	526	72.5	104	14.3	96	13.2
49	110	50.5	53	24.3	55	25.2	317	43.7	229	31.5	180	24.8
50	158	72.5	31	14.2	29	13.3	432	59.5	186	25.6	108	14.9
55	104	47.8	57	26.1	57	26.1	317	43.7	179	24.7	230	31.6
58	134	61.5	52	23.9	32	14.6	518	71.3	133	18.3	75	10.3
61	61	28.0	56	25.7	101	46.3	170	23.4	233	32.1	323	44.5
62	150	68.8	46	21.1	22	10.1	504	69.4	145	20.0	77	10.6

In item 16 of Table II(b) only the low achievers indicated a preference for teacher demonstrated experiments, 50.9 percent, while the other students stayed below the 50 percent criteria with a 47.1 percent "agree" response. Neither group surpassed the 50 percent criteria set in Chapter III in item 55 of Table II(b) in learning science best by teacher demonstrations. The data shows "agree" for 47.8 percent for low achievers and 43.7 percent "agree" for the other students.

A need was established by both groups for students participating in experiments as indicated by 68.8 percent "agree" by the low achievers and 74.8 percent "agree" by the other students in item 17 of Table II(b). Results from item 58 in Table II(b) showed that both groups felt that they learned best by participating in experiments, 61.3 percent "agree" for the low achievers and 71.3 percent "agree" for the other students.

Both groups of students, 77.5 percent of the low achievers and 71.6 percent of the other students, indicated a need for the teacher helping students on an individual basis as indicated by item 23 of Table II(b). Item 62 of Table II(b) confirms the learning process by this mode of instruction as indicated in item 23 with 68.8 percent of the low achievers and 69.4 percent of the other students replying "agree".

Scores in Table II(c) show that 83.0 percent of the low achievers and 82.5 percent of the other students agreed to item 24, that is, liking science after achieving well on a test. In item 63, 56.3 percent of the other students disagreed with the statement that the science course was

TABLE IIc

COMPARISON OF NUMBER AND PERCENTAGE SCORES FOR SELF EXPRESSED NEEDS OF JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS BETWEEN THE LOW ACHIEVERS AND OTHER STUDENTS WITH RESPECT TO GENERAL ATTITUDES TOWARD SCIENCE

	LOW ACHIEVERS (N = 218 STUDENTS)						OTHER STUDENTS (N = 726 STUDENTS)					
ITEM NUMBER	AGREE		UNDECIDED		DISAGREE		AGREE		UNDECIDED		DISAGREE	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
11	93	42.6	71	32.6	54	24.8	339	46.7	257	35.4	130	17.9
12	104	47.7	43	19.7	71	32.6	344	47.4	159	21.9	223	30.7
13	72	33.0	84	38.5	62	28.4	293	40.4	298	41.0	135	18.6
24	181	83.0	24	11.0	13	6.0	599	82.5	88	12.1	39	5.4
63	42	19.3	70	32.1	106	48.6	100	13.8	217	29.9	409	56.3
64	108	49.5	75	34.4	35	16.1	479	66.0	160	22.0	87	12.0
65	52	23.9	88	40.4	78	35.7	230	31.7	266	36.6	230	31.7

too difficult to read and follow. Only 48.6 percent of the low achievers disagreed with item 63 which would indicate that the low achievers found a greater degree of difficulty in comprehension than the other students.

In item 64 of Table II(c), 66.0 percent of the other students felt that they could understand most of the ideas in their science course while only 49.5 percent of the low achievers replied "agree" to item 64.

In Table II(d), both the low achievers and other students indicated a need for item 25, to learn about living things, 68.8 percent and 75.8 percent, respectively.

Only the low achievers, 51.8 percent surpassed the 50 percent criteria level for item 26, wanting to learn about electricity as shown in Table II(d).

Both the low achievers, 57.8 percent and the other students 61.2 percent surpassed the 50 percent criteria to item 28 of table II(d) indicating a need for astronomy in the junior high science curriculum.

A need for some chemistry at the junior high level was indicated by item 30 of Table II(d), 51.4 percent of the low achievers and 53.2 percent of the other students replied in the affirmative.

Only the low achievers, 60.1 percent indicated a need to learn about motors while 47.4 percent of the other students were below the 50 percent criteria in item 31 of Table II(d).

In item 32 of Table II(d), both the low achievers 55.0 percent and the other students 57.0 percent showed a need to learn about fossils.

A need for a nutrition course at the junior high science level

TABLE IId

COMPARISON OF NUMBER AND PERCENTAGE SCORES FOR SELF EXPRESSED NEEDS OF JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS BETWEEN THE LOW ACHIEVERS AND OTHER STUDENTS WITH RESPECT TO THE SCIENCE CURRICULUM CONTENT

ITEM NUMBER	LOW ACHIEVERS (N = 218 STUDENTS) AGREE		UNDECIDED		DISAGREE		OTHER STUDENTS (N = 726 STUDENTS) AGREE		UNDECIDED		DISAGREE	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
25	150	68.8	42	19.3	26	11.9	550	75.8	120	16.5	56	7.7
26	113	51.8	43	19.7	62	28.5	321	44.2	186	25.6	219	30.2
27	75	34.4	75	34.4	68	31.2	312	43.0	200	27.6	214	29.4
28	126	57.8	40	18.3	52	23.9	444	61.2	154	21.2	128	17.6
29	93	42.6	47	21.6	78	35.8	313	43.1	200	27.6	213	29.3
30	112	51.4	54	24.8	62	28.4	386	53.2	154	21.2	186	25.6
31	131	60.1	35	16.0	52	23.9	344	47.4	164	22.6	218	30.0
32	120	55.0	51	23.4	47	21.6	414	57.0	177	24.4	135	18.6
33	99	45.4	63	28.9	56	25.5	341	47.0	232	32.0	153	21.0
34	122	56.0	56	25.5	40	18.3	425	58.5	186	25.6	115	15.8
35	106	48.6	52	23.9	60	27.5	344	47.4	228	31.4	154	21.2
36	65	29.8	63	28.9	90	41.3	200	27.6	251	34.6	275	37.8
37	92	42.2	54	24.8	72	33.0	301	41.5	249	34.3	176	24.2
38	82	37.6	47	21.6	89	40.8	272	37.5	233	32.1	221	30.4
39	107	49.1	59	27.0	52	23.9	437	60.2	195	26.9	94	12.9

was established by the low achievers 56.0 percent and other students 58.5 percent as shown in item 34 of Table II(d).

However, only the other students 60.2 percent indicated a need to study about the environment in item 39 of Table II(d).

In Table II(e) item 41, both the low achievers 51.8 percent and the other students 52.2 percent felt that their knowledge in science would be useful after leaving school.

Question Three

Table III(a) to (e) provide data for question 3 posed in Problem One. What are the self-expressed needs of junior high students from inner city schools who are low achievers in terms of the learning environment, methods of instruction, attitudes toward science, science curriculum content, and opinions with respect to science?

Only those questions which meet the fifty percent criterion for a need are looked at in Tables III(a) to (e).

Of the two hundred and eighteen (218) low achievers who were sampled for their needs to methods of instruction: Table II(b) shows that 53.7 percent liked "in front of the class lessons", item 3; 74.3 percent liked class discussions, item 6; 85.3 percent liked filmstrips, item 8; 68.8 percent liked doing experiments by themselves, item 7; 50.9 percent liked teacher demonstrated experiments, item 16; and 77.5 percent liked the teacher to go around the classroom helping individual students, item 23.

Data from Table III(b) shows the low achievers learn best in:

TABLE IIe

COMPARISON OF NUMBER AND PERCENTAGE SCORES FOR SELF EXPRESSED NEEDS OF JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS BETWEEN THE LOW ACHIEVERS AND OTHER STUDENTS WITH RESPECT TO OPINIONS ABOUT SCIENCE

	LOW ACHIEVERS (N = 218 STUDENTS)						OTHER STUDENTS (N = 726 STUDENTS)					
ITEM NUMBER	AGREE		UNDECIDED		DISAGREE		AGREE		UNDECIDED		DISAGREE	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
40	93	42.6	58	26.6	67	30.7	340	46.8	185	25.5	201	27.7
41	113	51.8	58	26.6	47	21.6	379	52.2	191	26.3	156	21.5
42	96	44.1	44	20.2	78	35.7	218	30.0	172	23.7	336	46.3

TABLE IIIa

NUMBER AND PERCENTAGE SCORES FOR SELF-EXPRESSED NEEDS OF JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS WHO ARE LOW ACHIEVERS WITH RESPECT TO THE LEARNING ENVIRONMENT

LOW ACHIEVERS

(N = 218 STUDENTS)

ITEM NUMBER	AGREE		UNDECIDED		DISAGREE	
	NO.	%	NO.	%	NO.	%
1	111	50.9	38	17.4	69	31.7
2	95	43.6	49	22.5	74	33.9
9	196	89.9	15	6.9	7	3.2
10	150	68.8	43	19.7	25	11.5
14	78	35.8	95	43.6	45	20.6
15	56	25.6	89	40.8	73	33.6
18	74	33.9	98	45.0	46	21.1
19	56	25.6	105	48.2	57	26.1
20	17	7.8	31	14.2	170	78.0
21	152	69.7	34	15.6	32	14.7
43	116	53.2	55	25.2	47	21.6
44	69	31.6	66	30.3	83	38.1
51	171	78.4	29	13.3	18	8.3
52	114	52.3	54	24.8	50	22.9
53	61	28.0	102	46.8	55	25.2
54	47	21.6	104	47.7	67	30.7
56	68	31.2	109	50.0	41	18.8
57	37	17.0	125	57.3	56	25.5
59	43	19.7	44	20.2	131	60.1
60	112	51.4	55	25.2	51	23.4

TABLE IIIb

NUMBER AND PERCENTAGE SCORES FOR SELF-EXPRESSED NEEDS OF JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS WHO ARE LOW ACHIEVERS WITH RESPECT TO THE METHODS OF INSTRUCTION

LOW ACHIEVERS

(N = 218 STUDENTS)

ITEM NUMBER	AGREE		UNDECIDED		DISAGREE	
	NO.	%	NO.	%	NO.	%
3	117	53.7	55	25.2	46	21.1
4	65	29.8	56	25.7	97	44.5
5	71	32.6	54	24.8	93	42.6
6	162	74.3	27	12.4	29	13.3
7	91	41.7	56	25.7	71	32.6
8	186	85.3	21	9.6	11	5.1
16	111	50.9	42	19.3	65	29.8
17	150	68.8	39	17.9	29	13.3
22	79	36.2	42	19.3	97	44.5
23	169	77.5	33	15.1	16	7.4
45	116	53.2	62	28.4	40	18.3
46	60	27.5	64	29.4	94	43.1
47	85	39.0	61	28.0	72	33.0
48	151	69.3	42	19.3	25	11.4
49	110	50.5	53	24.3	55	25.2
50	158	72.5	31	14.2	29	13.3
55	104	47.8	57	26.1	57	26.1
58	134	61.5	52	23.9	32	14.6
61	61	28.0	56	25.7	101	46.3
62	150	68.8	46	21.1	22	10.1

item 45, 53.2 percent "agree" to teacher taught lessons; item 48, 69.3 percent "agree" with class discussions by students and teacher; item 49, 50.5 percent "agree" to small group discussions; item 50, 72.5 percent "agree" for films and filmstrips; item 58, 61.5 percent "agree" to learning best with the teacher going around the room and assisting the students.

Results in Table III(c) indicate that only in item 24, 83.0 percent replied "agree" to surpassing the 50 percent criteria established in Chapter III. In item 24, the low achievers' attitude toward science improved when they did well on a test in science.

Of the two hundred and eighteen (218) low achievers sampled, Table III(d) indicates their need in the following areas of science curriculum content. Item 25, 68.8 percent "agree" to a need for biology; item 26, 51.8 percent "agree" to a need to study electricity; item 28, 57.8 percent "agree" to a need for astronomy; item 30, 51.4 percent "agree" to a need for chemistry; item 31, 60.1 percent "agree" to a need for learning about motors; in item 32, 55.0 percent "agree" to a need to study fossils; item 34, 56.0 percent "agree" to a need to learn about nutrition.

Scores from Table III(e) indicate that 51.8 percent of the low achievers agreed to item 41 of the questionnaire that their knowledge of science would be useful to them after they leave school.

TABLE IIIc

NUMBER AND PERCENTAGE SCORES FOR SELF-EXPRESSED NEEDS OF JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS WHO ARE LOW ACHIEVERS WITH RESPECT TO THE GENERAL ATTITUDES TOWARD SCIENCE

LOW ACHIEVERS

(N = 218 STUDENTS)

ITEM NUMBER	AGREE		UNDECIDED		DISAGREE	
	NO.	%	NO.	%	NO.	%
11	93	42.6	71	32.6	54	24.8
12	104	47.7	43	19.7	71	32.6
13	72	33.0	84	38.5	62	28.4
24	181	83.0	24	11.0	13	6.0
63	42	19.3	70	32.1	106	48.6
64	108	49.5	75	34.4	35	16.1
65	52	23.9	88	40.4	78	35.7

TABLE IIId

NUMBER AND PERCENTAGE SCORES FOR SELF-EXPRESSED NEEDS OF JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS WHO ARE LOW ACHIEVERS WITH RESPECT TO THE SCIENCE CURRICULUM CONTENT

LOW ACHIEVERS
(N = 218 STUDENTS)

ITEM NUMBER	AGREE		UNDECIDED		DISAGREE	
	NO.	%	NO.	%	NO.	%
25	150	68.8	42	19.3	26	11.9
26	113	51.8	43	19.7	62	28.5
27	75	34.4	75	34.4	68	31.2
28	126	57.8	40	18.3	52	23.9
29	93	42.6	47	21.6	78	35.8
30	112	51.4	54	24.8	62	28.4
31	131	60.1	35	16.0	52	23.9
32	120	55.0	51	23.4	47	21.6
33	99	45.4	63	28.9	56	25.5
34	122	56.0	56	25.5	40	18.3
35	106	48.6	52	23.9	60	27.5
36	65	29.8	63	28.9	90	41.3
37	92	42.2	54	24.8	72	33.0
38	82	37.6	47	21.6	89	40.8
39	107	49.1	59	27.0	52	23.9

TABLE IIIe

NUMBER AND PERCENTAGE SCORES FOR SELF-EXPRESSED NEEDS OF JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS WHO ARE LOW ACHIEVERS WITH RESPECT TO OPINIONS ABOUT SCIENCE

LOW ACHIEVERS
(N = 218 STUDENTS)

ITEM	AGREE		UNDECIDED		DISAGREE	
NUMBER	NO.	%	NO.	%	NO.	%
40	93	42.6	58	26.6	67	20.7
41	113	51.8	58	26.6	47	21.6
42	96	44.1	44	20.2	78	35.7

Question Four

Tables IV (a) to (e) provide information for question 4 of Problem One. How do the self-expressed needs of junior high students who are low achievers differ for grades 7, 8, and 9 with respect to: the learning environment, methods of instruction, attitudes toward science, science curriculum content, and opinions with respect to science? The questions looked at are only those which meet the fifty percent criterion for a need.

Data in Table IV(a) shows the number and percentage scores for the self-expressed needs of low achievers junior high students according to grades 7, 8, and 9.

Only the grade 7, 55.2 percent and the grade 9, 58.8 percent showed a need for item 1, a regular classroom setting.

There was a consensus for item 9, a need for field trips, grade 7, 83.6 percent "agree"; grade 8, 91.6 percent "agree"; and grade 9, 79.4 percent "agree".

Across the board agreement on item 10, library work, grade 7, 76.1 percent; grade 8, 62.9 percent; and grade 9, 69.1 percent.

All three grades expressed a negative need for item 20, a strict teacher, 71.6 percent"disagree" for grade 7; 83.2 percent "disagree" for grade 8; and 77.9 percent "disagree" for grade 9.

A positive need was established for an easy-going teacher, item 21, grade 7, 76.1 percent "agree"; grade 8, 66.3 percent "agree"; and grade 9, 67.6 percent "agree".

A need was established for item 43, learning science best when taught in a regular classroom, by grades 7 and grade 9 only, 56.7 percent and 57.4 percent, respectively, replied "agree".

A need for item 51, learning science best when on field trips, and item 52, learning science best when allowed to work in the library, of the main questionnaire was expressed by all three grades.

A negative need for item 59, you learn best with a strict teacher was expressed by grades 7 and 9 only, grade 7, 55.2 percent "disagree" while 61.8 percent of the grade 9 population replied in the negative.

Only the grade 7, 56.7 percent and the grade 9, 50.0 percent reached the 50 percent "agree" citeria for item 60, you learn best with an easy-going teacher as shown in Table IV(a).

With regard to Table IV(b) which shows the percentage scores attained from the low achievers according to grades 7, 8, and 9 with respect to methods of instruction, the following needs are noted: A need for teacher taught lessons by grade 7, 56.7 percent "agree" and grade 9,

TABLE IVa

COMPARISON OF NUMBER AND PERCENTAGE SCORES FOR SELF-EXPRESSED NEEDS OF GRADES VII, VIII, AND IX LOW ACHIEVER JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS WITH RESPECT TO THE LEARNING ENVIRONMENT

	GRADE VII LOW ACHIEVERS (N = 67 STUDENTS)						GRADE VIII LOW ACHIEVERS (N = 83 STUDENTS)						GRADE IX LOW ACHIEVERS (N = 68 STUDENTS)					
ITEM	AGREE		UNDECIDED		DISAGREE		AGREE		UNDECIDED		DISAGREE		AGREE		UNDECIDED		DISAGREE	
NO.	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	37	55.2	9	13.4	21	31.3	34	41.0	18	21.7	31	37.3	40	58.8	11	16.2	17	25.0
2	27	40.3	18	26.9	22	32.8	41	49.4	20	24.1	22	26.5	27	39.7	11	16.2	30	44.1
9	56	83.6	6	9.0	5	7.4	76	91.6	5	6.0	2	2.4	54	79.4	14	20.6	0	0.0
10	51	76.1	12	17.9	4	6.0	52	62.9	19	22.9	12	14.4	47	69.1	12	17.6	9	13.2
14	27	40.3	25	37.3	15	22.4	29	34.9	38	45.8	16	19.3	22	32.4	32	47.0	14	20.6
15	24	35.8	22	32.8	31	46.3	16	19.3	38	45.8	29	34.9	16	23.5	29	42.6	23	33.8
18	25	37.3	26	38.8	16	23.9	28	33.7	35	42.2	20	24.1	21	30.9	37	54.4	10	14.7
19	19	28.4	28	41.8	20	29.9	23	27.7	39	47.0	21	25.3	14	20.6	38	55.9	16	23.5
20	4	6.0	15	22.4	48	71.6	8	9.6	6	7.2	69	83.2	5	7.4	10	14.7	53	77.9
21	51	76.1	10	14.9	6	9.0	55	66.3	13	15.7	15	18.0	46	67.6	11	16.2	11	16.2
43	38	56.7	16	23.9	13	19.4	39	47.0	21	25.3	23	27.7	39	57.4	18	26.5	11	16.2
44	24	35.8	18	26.9	25	37.3	27	32.5	26	31.3	30	36.2	18	26.5	22	32.4	28	41.1
51	49	73.1	8	12.0	10	14.9	69	83.2	9	10.8	5	6.0	53	77.9	12	17.6	3	4.4
52	36	53.7	16	23.9	15	22.4	43	51.8	20	24.1	20	24.1	35	51.5	18	26.5	15	22.0
53	21	31.3	26	38.8	20	29.9	21	25.3	41	49.4	21	25.3	19	27.9	35	51.5	14	20.6
54	21	31.3	29	43.3	17	25.4	16	19.3	39	47.0	28	33.7	10	14.7	36	51.5	22	32.4
56	26	38.8	27	40.3	14	20.9	23	27.7	43	51.8	17	20.5	19	27.9	39	57.4	10	14.7
57	15	22.4	33	49.2	19	28.4	15	18.0	45	54.2	23	27.7	7	10.3	47	69.1	14	20.6
59	17	25.4	18	26.9	37	55.2	13	15.7	45	54.2	23	27.7	13	19.1	13	19.1	42	61.8
60	38	56.7	15	22.4	14	20.9	40	48.2	22	26.5	21	25.3	34	50.0	18	26.5	16	23.5

TABLE IVb

COMPARISON OF NUMBER AND PERCENTAGE SCORES FOR SELF-EXPRESSED NEEDS OF GRADES VII, VIII, AND IX LOW ACHIEVER JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS WITH RESPECT TO THE METHODS OF INSTRUCTION

ITEM	GRADE VII LOW ACHIEVERS (N = 67 STUDENTS)						GRADE VIII LOW ACHIEVERS (N = 83 STUDENTS						GRADE IX LOW ACHIEVERS (N = 68 STUDENTS)					
	AGREE		UNDECIDED		DISAGREE		AGREE		UNDECIDED		DISAGREE		AGREE		UNDECIDED		DISAGREE	
NO.	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
3	38	56.7	18	26.9	11	16.4	41	49.4	21	25.3	21	25.3	38	55.9	16	23.5	14	20.6
4	17	25.4	15	22.4	35	52.2	28	33.7	26	31.3	29	35.0	20	29.4	15	22.1	33	48.5
5	20	29.9	13	19.4	34	50.7	32	38.6	21	25.3	30	36.1	19	27.9	20	29.4	29	42.7
6	56	83.6	2	3.0	9	13.4	57	68.7	14	16.9	12	14.4	49	72.0	11	16.2	8	11.8
7	32	47.8	17	25.4	18	26.9	28	33.7	21	25.3	34	41.0	31	45.6	18	26.5	19	27.9
8	57	85.1	3	4.5	7	10.4	71	85.5	12	14.4	0	0.0	58	85.3	6	8.8	4	5.9
16	37	55.2	13	19.4	15	22.4	36	43.4	15	18.0	32	38.6	36	52.9	14	20.6	18	26.5
17	41	61.2	15	22.4	11	16.4	62	74.7	9	10.8	12	14.5	47	69.1	15	22.1	6	8.8
22	26	38.8	12	17.9	29	43.3	33	39.7	16	19.3	34	41.0	20	29.4	14	20.6	34	50.0
23	49	73.1	12	17.9	0	0.0	62	74.7	13	15.7	8	9.6	58	85.3	8	11.8	2	2.9
45	39	58.2	17	25.4	11	16.4	41	49.4	25	30.1	17	20.5	36	52.9	20	29.4	12	17.6
46	16	23.9	22	32.8	29	43.3	27	32.5	21	25.3	35	42.2	17	25.0	21	30.9	30	44.1
47	24	35.8	23	34.3	20	29.9	35	42.2	22	26.5	26	31.3	26	38.3	16	23.5	36	38.2
48	45	67.2	14	20.9	8	11.9	60	72.3	14	16.9	9	10.8	46	67.6	14	20.6	8	11.8
49	41	61.2	15	22.4	11	16.4	38	45.8	22	26.5	23	27.7	31	45.6	16	23.5	21	30.9
50	46	68.7	9	13.4	12	17.9	69	83.2	7	8.4	7	8.4	43	63.2	15	22.1	10	14.7
55	46	68.7	15	22.4	11	16.4	32	38.6	25	30.1	26	31.3	31	45.6	17	25.0	20	29.4
58	44	65.7	15	22.4	8	11.9	52	62.7	16	19.3	15	18.0	38	55.9	21	30.9	9	13.2
61	22	32.8	18	26.9	26	38.8	25	30.1	20	24.1	38	45.8	14	20.6	17	25.0	37	54.4
62	43	64.1	18	26.9	6	9.0	54	65.1	17	20.5	12	14.4	53	77.9	11	16.2	4	5.9

55.9 percent "agree". A negative need for science presented by contracts, item 4, by grade 7, 52.2 percent "disagree". Also a negative need by the grades 7's, 50.7 percent "disagree" for item 5, a mixture of contracts and worksheets. A need for class discussions in item 6, at all three grade levels, 83.6 percent "agree", 68.7 percent "agree", and 72.0 percent "agree" for grades 7, 8, and 9, respectively.

A need for films and filmstrips in item 8 by all three grades, grade 7, 85.1 percent "agree"; grade 8, 85.5 percent "agree"; and 85.3 percent "agree".

A need for item 16, teacher demonstrations, by grades 7 and 8 only, 55.2 percent "agree" and 52.9 percent "agree", respectively.

For item 17, students participating in experiments, grade 7, 61.2 percent; grade 8, 74.7 percent; and grade 9, 69.1 percent replied "agree".

All three grade levels expressed a need for item 23, the teacher helping individual students, 73.1 percent "agree" for grade 7; 74.7 percent "agree" for grade 8; and 69.1 percent "agree" for grade 9.

Only the grade 7 low achievers, 58.2 percent "agree" and the grade 9 low achievers 52.9 percent "agree", showed a need for item 45, learning science best by means of teacher presented lessons.

All three grade levels showed a need for items 48, 50, 58, and 62 of Table IV(b) by surpassing the 50 percent "agree" criteria.

Only the grade 7 low achievers expressed a need for item 49, 61.2 percent "agree" and for item 55, 68.7 percent "agree".

The grade 9 low achievers expressed a negative need for item 61, 54.4 percent disagreeing with the statement: "You learn science best when the teacher talks most of the time".

Table IV(c) shows the percentage scores to general attitudes toward science from students who are low achievers in grades 7, 8, and 9.

It is of interest to note that only the grade 7 low achievers surpassed the 50 percent criteria for item 11, "You like science now!" The percentage got progressively lower in grade 8, 42.2 percent, and 30.9 percent in grade 9. It would appear that science seemed to turn the low achiever off somewhere at the grade 7 or grade 8 level, and even more at the grade 9 level.

In item 12, 52.2 percent of the grade 7 low achievers, 41.0 percent of the grade 8 low achievers and 51.5 percent of the grade 9 low achievers indicated that they liked science in elementary school.

All three grade levels indicated that their opinions about science improved when they achieved well on a test, item 24.

Only the grade 8 low achievers 55.4 percent disagreed with item 63 of the questionnaire, that is that the science course was too difficult to read and follow.

In item 64, only the grade 7 low achievers 58.2 percent thought that they understood the ideas presented to them.

Table IV(d) breaks down the responses of the two hundred and eighteen (218) low achievers into grades 7, 8, and 9 with respect to the science curriculum content.

All three grades, 7, 8, and 9 with 61.2 percent, 73.5 percent, and 70.6 percent "agree", respectively, indicated a need for item 25 of

TABLE IVc

COMPARISON OF NUMBER AND PERCENTAGE SCORES FOR SELF-EXPRESSED NEEDS OF GRADES VII, VIII, AND IX LOW ACHIEVER JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS WITH RESPECT TO GENERAL ATTITUDES TOWARD SCIENCE

	GRADE VII LOW ACHIEVERS (N = 67 STUDENTS)						GRADE VIII LOW ACHIEVERS (N = 83 STUDENTS)						GRADE IX LOW ACHIEVERS (N = 68 STUDENTS)					
ITEM	AGREE		UNDECIDED		DISAGREE		AGREE		UNDECIDED		DISAGREE		AGREE		UNDECIDED		DISAGREE	
NO.	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
11	37	55.2	20	29.0	10	14.9	35	42.2	37	44.5	21	25.3	21	30.9	24	35.3	23	33.8
12	35	52.2	8	11.9	24	35.8	34	41.0	21	25.3	28	33.7	35	51.5	14	20.6	19	27.9
13	20	29.9	31	46.3	16	23.9	29	34.9	33	39.8	21	25.3	23	33.8	20	29.4	25	36.8
24	60	89.6	3	4.5	4	6.0	65	78.3	13	15.7	5	6.0	56	82.4	8	11.8	4	5.8
63	18	26.9	16	23.9	33	49.2	12	14.5	25	30.1	46	55.4	12	17.6	29	42.6	27	39.7
64	39	58.2	17	25.4	11	16.4	37	44.5	35	42.2	11	13.3	32	47.1	23	33.8	13	19.1
65	23	34.3	28	41.8	16	23.9	16	19.3	34	41.0	33	39.8	13	19.1	26	38.3	29	42.6

TABLE IVd

COMPARISON OF NUMBER AND PERCENTAGE SCORES FOR SELF-EXPRESSED NEEDS OF GRADES VII, VIII, AND IX LOW ACHIEVER JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS WITH RESPECT TO THE SCIENCE CURRICULUM CONTENT

	GRADE VII LOW ACHIEVERS (N - 67 STUDENTS)						GRADE VIII LOW ACHIEVERS (N = 83 STUDENTS)						GRADE IX LOW ACHIEVERS (N = 68 STUDENTS)					
ITEM	AGREE		UNDECIDED		DISAGREE		AGREE		UNDECIDED		DISAGREE		AGREE		UNDECIDED		DISAGREE	
NO.	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
25	41	61.2	14	20.9	12	17.9	61	73.5	15	18.0	7	8.4	48	70.6	11	16.2	7	10.3
26	41	61.2	11	16.4	15	22.4	41	49.4	18	21.7	24	28.9	31	45.6	14	20.6	23	33.8
27	22	32.8	26	38.8	19	28.4	30	36.2	26	31.3	27	32.5	23	33.8	23	33.8	22	32.4
28	40	59.7	10	14.9	17	25.4	44	53.0	15	18.0	24	28.9	42	61.8	15	22.1	11	16.2
29	28	41.8	17	25.4	22	32.8	41	49.4	13	15.7	29	34.9	24	35.3	17	25.0	27	39.7
30	35	52.2	11	16.4	21	31.3	41	49.4	17	20.5	25	30.1	36	52.9	16	23.5	16	23.5
31	38	56.7	13	19.4	16	23.9	52	62.7	15	18.0	16	19.3	41	60.3	7	10.3	20	29.4
32	40	59.7	16	23.9	11	16.4	47	56.6	19	22.9	17	20.5	33	48.5	16	23.5	19	27.9
33	29	43.3	19	28.4	19	28.4	32	38.6	29	34.9	22.	26.5	38	55.9	15	22.1	15	22.1
34	46	68.7	11	16.4	10	14.9	39	47.0	25	30.1	19	22.9	37	54.4	20	29.4	11	16.2
35	35	52.2	13	19.4	19	28.4	36	43.4	22	26.5	25	30.1	35	51.5	17	25.0	16	23.5
36	23	34.3	15	22.4	29	43.3	29	34.9	23	27.7	31	37.4	13	19.1	25	36.8	30	44.1
37	32	47.8	14	20.9	21	31.4	32	38.6	25	30.1	26	31.3	28	41.2	15	22.1	25	36.8
38	31	46.3	11	16.4	25	37.3	30	36.1	19	22.9	34	41.0	21	30.9	17	25.0	30	44.1
39	32	47.8	17	25.4	18	26.8	38	45.8	25	30.1	20	24.1	37	54.4	17	25.0	14	20.6

the questionnaire, a need for a course in biology at the junior high level.

Only the grade 7 low achievers 61.2 percent "agree" indicated a need for item 26, the study of electricity.

Item 28, astronomy, was favoured at all three grades, 59.7 percent "agree", grade 7; 53.0 percent "agree" in grade 8; and 61.8 percent "agree" in grade 9.

Once again only the grade 7 low achievers, 52.2 percent "agree"; and the grade 9 low achievers, 52.9 percent "agree", indicated a need for chemistry in item 30.

All grade levels indicated a need for item 31, the study of motors, grade 7, 56.7 percent "agree"; grade 8, 62.7 percent "agree"; and grade 9, 60.3 percent "agree"; while only the grades 7, 59.7 percent "agree" and grade 8, 56.6 percent "agree" showed a need for item 32, the study of fossils.

Only the grade 9 low achievers 55.9 percent "agree" indicated a need for a course on water supply and sewage treatment as per item 33 of the questionnaire.

Both the grade 7 low achievers 68.7 percent "agree" and 52.2 percent "agree" and the grade 9 low achievers 54.4 percent "agree" and 51.5 percent "agree" indicated a need for items 34 and 35, respectively, of the questionnaire relating to curriculum content, the study of nutrition and the study of the human body (health), respectively.

The grade 9 low achievers 54.4 percent "agree" indicated a need for environmental studies as per item 39 of the questionnaire.

In Table IV(e) only the grade 9 low achievers 53.7 percent "agree" felt that the material they studied in science was of use to them at that moment. However, 60.2 percent of the grade 7 low achievers "agree" and 59.7 percent of the grade 9 low achievers "agree" to item 41 indicating that what they learned in science would be of use to them in the future.

Only the grade 9 low achievers 56.7 percent "agree" felt that science should be made optional at the junior high level as per item 42.

Part II - Questions Five to Nine

The following null hypotheses are to be tested by means of data in Tables V(a) to (e) and VI(a) to (e) obtained from the Statistical Package for the Social Sciences SPSSH-Version 6.01:

1. There is no significant difference (at the 0.05 level of significance) between the low achievers and others for males with respect to each of the questionnaire items.
2. There is no significant difference (at the 0.05 level of significance) between the low achievers and others for females with respect to each of the questionnaire items.
3. There is no significant difference (at the 0.05 level of significance) between the grade 7 low achievers and other grade 7 students with respect to each of the questionnaire items.
4. There is no significant difference (at the 0.05 level of significance) between the grade 8 low achievers and other grade 8 students with respect to each of the questionnaire items.

TABLE IVe

COMPARISON OF NUMBER AND PERCENTAGE SCORES FOR SELF-EXPRESSED NEEDS OF GRADES VII, VIII, AND IX LOW ACHIEVER JUNIOR HIGH STUDENTS FROM INNER CITY SCHOOLS WITH RESPECT TO OPINIONS ABOUT SCIENCE

ITEM	GRADE VII LOW ACHIEVERS (N - 67 STUDENTS)						GRADE VIII LOW ACHIEVERS (N = 83 STUDENTS)						GRADE IX LOW ACHIEVERS (N = 68 STUDENTS)					
	AGREE		UNDECIDED		DISAGREE		AGREE		UNDECIDED		DISAGREE		AGREE		UNDECIDED		DISAGREE	
NO.	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
40	34	41.0	25	30.1	24	28.9	23	33.8	18	26.5	27	39.7	36	53.7	15	22.4	16	23.9
41	50	60.2	23	27.7	10	12.1	23	33.8	22	32.4	22	32.4	40	59.7	13	19.4	14	20.9
42	34	41.0	15	18.0	34	41.0	24	35.3	16	23.5	28	41.2	38	56.7	13	19.4	16	23.9

5. There is no significant difference (at the 0.05 level of significance) between the grade 9 low achievers and other grade 9 students with respect to each of the questionnaire items.

Tables V(a) to V(e) contain the degree of significant difference between low achievers and other students in terms of male and female. Tables VI(a) to VI(e) represent the degree of significant difference between the low achievers and other students in terms of grade 7, grade 8, and grade 9.

Tables V(a) and VI(a) have items relating to the learning environment from the main questionnaire, Tables V(b) and VI(b) have items with respect to methods of instruction, Tables V(c) and VI(c) contain items with respect to general attitudes toward science, Tables V(d) and VI(d) have items related to the science curriculum content, while Tables V(e) and VI(e) deal with opinions about science.

Also, an analysis of Tables VII, VIII, IX, XI, and XII will be done in an attempt to answer questions 1, 2, and 3 of Problem Two. Tables VII, VIII, and IX show the number and percentage scores for items 1 to 10 and 14 to 23 of the main questionnaire which represent likes and are paralleled by items 43 to 62 of the main questionnaire which represent learning. Table VII deals with all the students, Table VIII for the low achievers, and Table IX for other students with respect to likes and learning.

Tables X, XI, and XII show the correlation coefficients between items 1 to 10 and 14 to 23 of the main questionnaire which represent likes and are paralleled by items 43 to 62 of the main questionnaire which represent learning. Table X shows the correlation coefficients for all students, Table XI for low achievers, Table XII for other students with respect to likes and learning. The correlation coefficients were obtained by means of the Statistical Package for Social Sciences SPSSH-Version 6.01 to a .001 level of significance.

Data from Table V(a) shows that there is a significant difference of 0.0257 (at the 0.05 level of significance) for item 1, liking science best in a regular classroom between the low achievers and the other students in terms of females. Table VI(a) shows a significant difference of 0.0383 for the grade 7 students with regard to item 1 of the questionnaire, a regular classroom learning environment.

In item 2 of Table VI(a), large classroom learning environment, the grade 8 low achievers and other students showed a significant difference of 0.0496. In item 10 of Table V(a), library work by the student, there was a significant difference of 0.0377 between the male low achievers and male other students. Table VI(a), item 10, library work by the student shows a significant difference of 0.0355 between the grade 7 low achievers and grade 7 other students. In item 15 of Table VI(a), afternoon classes, the grade 8 students showed a significant difference of 0.0473 between the low achievers and the other students.

In Table V(a), item 20, liking science with a strict teacher, there is a significant difference of 0.0225 between the female low achievers and female other students. Item 43 of Table V(a), learning science best in a regular classroom, there is a significant difference of 0.0090 between the low achievers and other students in terms of

TABLE Va

DEGREE OF SIGNIFICANT DIFFERENCE BETWEEN THE LOW ACHIEVERS AND THE OTHER STUDENTS FOR MALES AND FEMALES WITH RESPECT TO THE LEARNING ENVIRONMENT

ITEM NUMBER	MALES	FEMALES
1	0.6870	0.0257*
2	0.0562	0.7928
9	0.1079	0.5653
10	0.0377*	0.1393
14	0.2644	0.8975
15	0.2162	0.2378
18	0.2866	0.0991
19	0.0988	0.1307
20	0.8982	0.0225*
21	0.3347	0.0162*
43	0.2652	0.0090*
44	0.2305	0.0127*
51	0.2476	0.0172*
52	0.6348	0.1239
53	0.1567	0.0705
54	0.2513	0.3965
56	0.6150	0.8399
57	0.4847	0.3900
59	0.1270	0.0024*
60	0.4138	0.0040*

* Significant difference of 0.05 or less.

females. Also, item 51 of Table V(a), learning science best on field trips, shows a significant difference of 0.0172 between the female low achievers and female other students.

Items 21 and 44 both show a significant difference below the 0.05 level of significance between the low achievers and the other students for females 0.0162 and 0.0127 in Table V(a) and in terms of grade 7 students, 0.0145 and 0.0095 in Table VI(a). In item 59, having a strict teacher, there is a significant difference (at the 0.05 level of significance) for the low achievers and other students only for the female population 0.0024, Table V(a) and the grade 8 group 0.0320, Table VI(a).

The null hypotheses stated in questions 5 - 9 in Chapter III between low achievers and other students with respect to male, female, grades 7, 8, and 9 can be accepted for items 9, 14, 18, 52, 53, 54, 56, and 60 with respect to the learning environment, Tables V(a) and VI(a).

Tables V(b) deals with the significant difference (at the 0.05 level of significance) between the low achievers and other students in terms of male and female, while Table VI(b) deals with grade 7, 8, and 9 to see if the null hypotheses stated in questions 5 - 9 can be accepted for the items in the questionnaire related to the methods of instruction.

Item 4 of Table V(b), using contracts for methods of instruction, shows a significant difference of 0.0055 in terms of males 0.0218 in terms of grade 7 students, Table VI(b) between the low achievers and other students both below the 0.05 level of significance. Items 6 and 8

TABLE Vb

DEGREE OF SIGNIFICANT DIFFERENCE BETWEEN THE LOW ACHIEVERS AND THE OTHER STUDENTS FOR MALES AND FEMALES WITH RESPECT TO METHODS OF INSTRUCTION

ITEM NUMBER	MALES	FEMALES
3	0.9809	0.4747
4	0.0055*	0.2519
5	0.7658	0.8474
6	0.3472	0.1161
7	0.1856	0.1515
8	0.2220	0.2202
16	0.4768	0.1917
17	0.6338	0.3301
22	0.7827	0.1090
23	0.1680	0.1914
45	0.7114	0.5103
46	0.0942	0.2071
47	0.5001	0.3415
48	0.0251*	0.0428*
49	0.0848	0.3889
50	0.1003	0.0333*
55	0.2937	0.2298
58	0.3317	0.0170*
61	0.6429	0.2299
62	0.8944	0.7379

* Significant difference of 0.05 or less

show a significant difference between the low achievers and other students (at the 0.05 level of significance) for grade 7's only, 0.0343 and 0.0261, Table VI(b). In item 47 only the grade 9 sample 0.0478 was within the 0.05 level of significance, Table VI(b). In item 48 both the males and females indicated a significant difference of 0.0251 and 0.0428, Table VI(b), below the 0.05 level of significance.

Item 50 of Table V(b) shows the female population with a significant difference of 0.0333 while Table VI(b) shows the grade 8 student population with a significant difference of 0.0124. In item 58, Table V(b) the female population has a significant difference of 0.0014 between the low achievers and other students.

The null hypotheses stated in questions 5 - 9 can be accepted for items 3, 5, 7, 16, 17, 22, 23, 45, 46, 47, 49, 53, 61, and 62 of the learning environment, Tables V(b) and VI(b).

Tables V(c) and VI(c) show the significant difference between low achievers and other students in terms of males and females and grades 7, 8, and 9, respectively. The data indicates whether the null hypotheses stated in questions 5 - 9 in Chapter III are valid for general attitudes toward science.

Table V(c) indicates a significant difference between the low achievers and other students of less than 0.05 in terms of both male 0.0432, and female 0.0190 population for item 11, "You like science now." Table VI(c) indicates a significant difference of less than 0.05 for item 11 between the low achievers and other students.

In item 13, Table V(c) the male population showed a significant

TABLE Vc

DEGREE OF SIGNIFICANT DIFFERENCE BETWEEN THE LOW ACHIEVERS AND THE OTHER STUDENTS FOR MALES AND FEMALES WITH RESPECT TO GENERAL ATTITUDES TOWARDS SCIENCE

ITEM NUMBER	MALES	FEMALES
11	0.0432*	0.0190*
12	0.2656	0.7881
13	0.0426*	0.0968
24	0.8534	0.9412
63	0.1894	0.2104
64	0.0630	0.0001*
65	0.1174	0.5127

* Significant difference of 0.05 or less

difference of less than 0.05, at 0.0426.

In item 63, Table VI(c) the grade 7 population indicated a significant difference of 0.0204 and the grade 9 population 0.0112 both of which are less than the accepted 0.05 level of significance.

Table V(c) shows item 64 with the female population having a significant difference of 0.001 between the low achievers and other students, while Table VI(c) shows a significant difference of 0.006 and 0.0237 for grade 8 and 9, respectively, both less than 0.05.

The null hypotheses stated in questions 5 - 9 can be accepted for items 12, 24, and 65 with respect to general attitudes toward science as shown in Tables V(c) and VI(c).

Data in Table V(d) tests the null hypotheses stated in Problem One, questions 5 and 6, that there is no significant difference (at the 0.05 level of significance) between the low achievers and other students in terms of males and females, while data in Table VI(d) tests the null hypotheses in terms of grade 7, 8, and 9 as stated in questions 7, 8, and 9 with respect to the science curriculum content.

Items 25, 27, 28, 38, and 39 of Table VI(d) indicate a significant difference of 0.0029, 0.0306, 0.0340, 0.0102, and 0.0138, respectively less than 0.05 in terms of the grade 7 population with respect to the curriculum content.

Items 37 and 38 of Table V(d) show a significant difference of 0.0263 and 0.0041 less than 0.05 in terms of the male population between the low achievers and the other students with respect to the curriculum content.

TABLE Vd

DEGREE OF SIGNIFICANT DIFFERENCE BETWEEN THE LOW ACHIEVERS AND THE OTHER STUDENTS FOR MALES AND FEMALES WITH RESPECT TO THE SCIENCE CURRICULUM CONTENT

ITEM NUMBER	MALES	FEMALES
25	0.6388	0.1935
26	0.7308	0.1068
27	0.4261	0.0325*
28	0.3127	0.3421
29	0.1266	0.5231
30	0.3647	0.4570
31	0.4643	0.1840
32	0.4688	0.7917
33	0.6504	0.2005
34	0.3413	0.2856
35	0.1335	0.1503
36	0.0933	0.8832
37	0.0263*	0.0436*
38	0.0041*	0.4468
39	0.3111	0.0001*

* Significant difference of 0.05 or less

TABLE Ve

DEGREE OF SIGNIFICANT DIFFERENCE BETWEEN THE LOW ACHIEVERS AND THE OTHER STUDENTS FOR MALES AND FEMALES WITH RESPECT TO OPINIONS ABOUT SCIENCE

ITEM NUMBER	MALES	FEMALES
40	0.3854	0.9000
41	0.4039	0.5297
42	0.0663	0.0077*

* Significant difference of 0.05 or less

TABLE VIa

DEGREE OF SIGNIFICANT DIFFERENCE BETWEEN THE LOW ACHIEVERS AND THE OTHER STUDENTS IN TERMS OF GRADE VII, VIII, AND IX WITH RESPECT TO THE LEARNING ENVIRONMENT

ITEM NUMBER	GRADE VII	GRADE VIII	GRADE IX
1	0.0383*	0.0901	0.1771
2	0.3025	0.0496*	0.3233
9	0.0549	0.8881	0.3778
10	0.0355*	0.5934	0.0535
14	0.4920	0.6566	0.8487
15	0.2447	0.0473*	0.5427
18	0.0598	0.3550	0.8344
19	0.0287*	0.3372	0.4407
20	0.4697	0.0939	0.2499
21	0.0145*	0.2165	0.5976
43	0.3288	0.0648	0.3635
44	0.0095*	0.0503	0.9404
51	0.0589	0.4119	0.7890
52	0.4107	0.8546	0.1854
53	0.1495	0.7377	0.5136
54	0.2400	0.1956	0.5523
56	0.1758	0.7756	0.7013
57	0.3443	0.8374	0.1042
59	0.3987	0.0320*	0.1591
60	0.0108*	0.8478	0.2817

* Significant difference of 0.05 or less

TABLE VIb

DEGREE OF SIGNIFICANT DIFFERENCE BETWEEN THE LOW ACHIEVERS AND THE OTHER STUDENTS IN TERMS OF GRADES VII, VIII, AND IX WITH RESPECT TO THE METHODS OF INSTRUCTION

ITEM NUMBER	GRADE VII	GRADE VIII	GRADE IX
3	0.3029	0.6028	0.1391
4	0.0218*	0.5087*	0.3932
5	0.4673	0.9525	0.2546
6	0.0343*	0.8612	0.3854
7	0.5186	0.1320	0.3677
8	0.0261*	0.0920	0.2750
16	0.6912	0.3339	0.0695
17	0.2641	0.3795	0.0656
22	0.3477	0.5706	0.3571
23	0.9592	0.0669	0.5000
45	0.4917	0.4238	0.3069
46	0.1722	0.1613	0.6850
47	0.9308	0.9139	0.0478*
48	0.4984	0.4363	0.6160
49	0.1445	0.4285	0.2607
50	0.1059	0.0124*	0.4871
55	0.2400	0.1956	0.5523
58	0.9260	0.3462	0.0014*
61	0.6228	0.4384	0.6326
62	0.5153	0.8633	0.8626

*Significant difference of 0.05 or less

TABLE VIc

DEGREE OF SIGNIFICANT DIFFERENCE BETWEEN THE LOW ACHIEVERS AND THE OTHER STUDENTS IN TERMS OF GRADES VII, VIII, AND IX WITH RESPECT TO THE GENERAL ATTITUDES TOWARD SCIENCE

ITEM NUMBER	GRADE VII	GRADE VIII	GRADE IX
11	0.7709	0.3931	0.0394*
12	0.1006	0.6998	0.9796
13	0.0542	0.2307	0.1613
24	0.4649	0.8055	0.9618
63	0.0204*	0.7372	0.0112*
64	0.1255	0.0006*	0.0237*
65	0.6692	0.1058	0.3473

* Significant difference of 0.05 or less

TABLE VId

DEGREE OF SIGNIFICANT DIFFERENCE BETWEEN THE LOW ACHIEVERS AND THE OTHER STUDENTS IN TERMS OF GRADES VII, VIII, AND IX WITH RESPECT TO THE SCIENCE CURRICULUM CONTENT

ITEM NUMBER	GRADE VII	GRADE VIII	GRADE IX
25	0.0029*	0.8142	0.4021
26	0.4995	0.2986	0.2807
27	0.0306*	0.4687	0.6045
28	0.0340*	0.0773	0.4602
29	0.0756	0.2113	0.9832
30	0.2518	0.5726	0.7283
31	0.2210	0.3270	0.0511
32	0.8079	0.8699	0.7986
33	0.2037	0.7701	0.8635
34	0.5674	0.2109	0.6512
35	0.0709	0.2702	0.6553
36	0.0619	0.5345	0.6347
37	0.1548	0.0654	0.2486
38	0.0102*	0.0607	0.4614
39	0.0138*	0.0949	0.2253

* Significant difference of 0.05 or less

TABLE VIe

DEGREE OF SIGNIFICANT DIFFERENCE BETWEEN THE LOW ACHIEVERS AND THE OTHER STUDENTS IN TERMS OF GRADES VII, VIII, AND IX WITH RESPECT TO OPINIONS ABOUT SCIENCE

ITEM NUMBER	GRADE VII	GRADE VIII	GRADE IX
40	0.8656	0.7068	0.9073
41	0.4591	0.2552	0.7268
42	0.0001*	0.2851	0.1869

* Significant difference of 0.05 or less

Items 27, 37, and 39 of Table V(d) show a significant difference of 0.0325, 0.0436, and 0.001, respectively, all of which are less than the 0.05 level of significance between the low achievers and other students in terms of the female population.

The null hypotheses stated in questions 5 - 9 of Chapter III are accepted for items 26, 29, 30, 31, 32, 33, 34, 35, and 36 with respect to the curriculum content between the low achievers and other students in terms of male and female, Table V(d), and in terms of grades7, 8, and 9, Table VI(d).

Tables V(e) and VI(e) show that the null hypotheses stated in questions 5 - 9 of Chapter III are accepted only for item 42 in terms of female population 0.0077, and in terms of the grade 7 population 0.0001, with respect to opinions toward science.

Part III - Problem II - Questions One, Two, and Three

The number and percentage comparison of the relationship between items which represent likes and parallel items which represent learning for the nine hundred and forty-four students sampled are represented in Table VII.

In Table VII, 52.4 percent indicated "agree" to item 1, liking science best when taught in a regular classroom. At the same time, 58.3 percent replied "agree" to item 43, where they felt that they learned science best in a regular classroom. This consists of a difference of 5.9 percent between liking and learning. Also 25.9 percent disagreed with item 1, while only 18.3 percent disagreed with

TABLE VII

NUMBER AND PERCENTAGE COMPARISON OF THE RELATIONSHIP BETWEEN LIKES AND LEARNING FOR ALL STUDENTS

(N = 944 STUDENTS)

	LIKES							LEARNING					
ITEM	AGREE		UNDECIDED		DISAGREE		ITEM	AGREE		UNDECIDED		DISAGREE	
NO.	N	%	N	%	N	%	NO.	N	%	N	%	N	%
1	495	52.4	205	21.7	244	25.9	43	550	58.3	221	23.4	173	18.3
2	350	37.1	233	24.7	361	38.2	44	234	24.8	292	30.9	418	44.3
3	515	54.5	218	23.1	211	22.4	45	535	56.7	233	24.7	176	18.6
4	232	24.6	298	31.1	414	43.8	46	209	22.1	337	35.7	398	42.8
5	330	35.0	250	26.5	364	38.5	47	376	39.8	291	30.8	277	29.4
6	687	72.8	146	15.5	111	11.7	48	677	71.7	146	15.5	121	12.8
7	387	41.0	294	31.1	263	27.9	49	427	45.2	282	29.9	235	24.9
8	744	78.8	137	14.5	63	6.7	50	590	62.5	217	23.0	137	14.5
9	832	88.1	86	9.1	26	2.8	51	697	73.8	176	18.6	71	7.5
10	579	61.3	219	23.2	146	15.5	52	438	46.4	256	27.1	250	26.5
14	307	32.5	411	43.5	226	24.0	53	222	23.5	489	51.8	233	24.7
15	275	29.1	408	43.2	261	27.6	54	218	23.1	493	51.2	233	20.7
16	453	48.0	190	20.1	301	31.9	55	421	44.6	236	25.0	287	30.4
17	693	73.4	142	15.1	109	11.5	58	652	69.1	185	19.6	107	11.3
18	312	33.1	478	50.6	154	16.3	56	301	31.9	474	50.2	168	17.9
19	191	20.2	530	56.2	223	23.6	57	152	16.2	546	57.8	246	26.1
20	80	8.5	180	19.1	684	72.4	59	214	22.6	253	26.8	477	50.6
21	578	61.2	209	22.1	157	16.7	60	403	42.7	283	30.0	258	27.3
22	299	31.7	203	21.5	442	46.8	61	231	24.5	289	30.6	424	44.9
23	689	73.0	181	19.2	74	7.8	62	654	69.3	191	20.3	99	10.5

item 43, a difference of 7.6 percent.

In item 2, 37.1 percent replied "agree" to liking science best when taught in an open area while only 24.8 percent felt that they learned science best when taught in an open area as per item 44. This represents a difference of 12.3 percent. Also 38.2 percent disagreed with item 2 while 44.3 percent disagreed with item 44, a difference of 6.1 percent.

A percentage of 38.5 of the nine hundred and forty-four students disagreed with item 5, liking science best by a mixture of lessons, contracts and worksheets, while only 29.2 percent disagreed with item 47, learning science best by a mixture of lessons, contracts and worksheets. This consists of a difference of 9.1 percent.

In item 8, 78.8 percent replied "agree" to liking films and filmstrips as per item 50. This is a difference of 16.3 percent between liking and learning.

Item 9 and item 51 show a difference of 14.3 percent with 88.1 percent of the students liking field trips while only 73.8 percent felt that they learned best from field trips.

In item 10, 61.3 percent liked to work in the library while only 46.4 percent felt that they learned best in the library as per item 52. This represents a difference of 17.9 percent. This is further supported by 15.5 percent replying "disagree" to item 10, while 26.5 percent replying "disagree" to item 52, a difference of 11.0 percent.

Item 14, liking classes before noon shows 32.5 percent "agree" while only 23.5 percent shows "agree" to item 53, learning science best before noon classes, a difference of 9.0 percent.

In item 15, liking science best in the afternoon, 29.1 percent replied "agree" while only 23.1 percent felt that they learned science best in the afternoon as per item 54, a difference of 6.0 percent. Also there was a 6.9 percent difference between the negative responses to items 15 and 54.

In item 20, liking science best with a strict teacher only 8.5 percent of the entire population sampled replied "agree", however 22.6 percent felt that they did learn best with a strict teacher as indicated by item 59.

Item 21 shows that 61.2 percent liked science best with an easy-going teacher while only 42.7 percent felt that they learned science best with an easy-going teacher as in item 60. This consists of a difference of 18.5 percent.

In item 22, 31.7 percent of the students felt that they liked a teacher who talked most of the time while only 24.5 percent felt that they learned best with a teacher who talked most of the time as per item 61.

The remaining items in Table VII correlate with a difference of less than 5 percent between liking and learning.

Table VIII consists of number and percentage comparison between items which represent likes and parallel items which are represented by similar learning situations for a group of two hundred and eighteen low achievers.

In item 1, 31.7 percent replied "disagree" to a regular

TABLE VIII

NUMBER AND PERCENTAGE COMPARISON OF THE RELATIONSHIP BETWEEN LIKES AND LEARNING FOR LOW ACHIEVERS

(N = 218 STUDENTS)

	LIKES							LEARNING					
ITEM NO.	AGREE		UNDECIDED		DISAGREE		ITEM NO.	AGREE		UNDECIDED		DISAGREE	
	N	%	N	%	N	%		N	%	N	%	N	%
1	111	50.9	38	17.4	69	31.7	43	116	53.2	55	25.2	47	21.6
2	95	43.6	49	22.5	74	33.9	44	69	31.6	66	30.3	83	38.1
3	117	53.7	55	25.2	46	21.1	45	116	53.2	62	28.4	40	18.3
4	65	29.8	56	25.7	97	44.5	46	60	27.5	64	29.4	94	43.1
5	71	32.6	54	24.8	93	42.6	47	85	39.0	61	28.0	72	33.0
6	162	74.3	27	12.4	29	13.3	48	151	69.3	42	19.3	25	11.4
7	91	41.7	56	25.7	71	32.6	49	110	50.5	53	24.3	55	25.2
8	186	85.3	21	9.6	11	5.1	50	158	72.5	31	14.2	29	13.3
9	196	89.9	15	6.9	7	3.2	51	171	78.4	29	13.3	18	8.3
10	150	68.8	43	19.7	25	11.5	52	114	52.3	54	24.8	50	22.9
14	78	35.8	95	43.6	45	20.6	53	61	28.0	102	46.8	55	25.2
15	56	25.6	89	40.8	73	33.6	54	47	21.6	104	47.7	67	30.7
16	111	50.9	42	19.3	65	29.8	55	104	47.8	57	26.1	57	26.1
17	150	68.8	39	17.9	29	13.3	58	134	61.5	52	23.9	32	14.6
18	74	33.9	98	45.0	46	21.1	56	68	31.2	109	50.0	41	18.8
19	56	25.5	105	48.2	57	26.1	57	37	17.0	125	57.3	56	25.5
20	17	7.8	31	14.2	170	78.0	59	43	19.7	44	20.2	131	60.1
21	152	69.7	34	15.6	32	14.7	60	112	51.4	55	25.2	51	23.4
22	79	36.2	42	19.3	97	44.5	61	61	28.0	56	25.7	101	46.3
23	169	77.5	33	15.1	16	7.4	62	150	68.8	46	21.1	22	10.1

classroom while only 21.6 percent of the low achievers felt that they did not learn well in a regular classroom as per item 43.

Item 2 shows that 43.6 percent of the low achievers liked an open area while only 31.6 percent felt that they learned best in an open area as per item 44. This is a difference of 12.0 percent.

For item 5, 32.6 percent of the low achievers liked a mixture of lessons, contracts and worksheets and even a higher percentage, 39.0 of the low achievers felt that they learned science best by a mixture of lessons, contracts, and worksheets.

In item 7, 41.7 percent of the low achievers felt that they liked science best in small group discussions while even a greater number felt that they learned science best in small group discussions, 50.5 percent as per item 49.

In item 8, 85.3 percent of the low achievers liked science best with films and filmstrips while only 72.5 percent of the low achievers felt that they learned science best by means of films and filmstrips as in item 50.

With respect to field trips, 89.9 percent of the low achievers liked science best when on field trips, item 9, while only 78.4 percent of the low achievers felt that they learned science best on field trips as shown in item 51.

Item 14 shows 35.8 percent of the low achievers liking science best before noon while only 28.0 percent felt that they learned science best in before noon classes, item 53.

In item 17, 68.8 percent of the low achievers liked doing experiments on their own while only 61.5 percent of the low achievers felt that they learned science best by doing the experiments by themselves, item 58. This is a difference of 7.3 percent.

Item 19, having a woman science teacher, 25.5 percent of the low achievers liked a woman science teacher while 17.0 percent felt that they learned best with a woman science teacher, item 57. This represents a difference of 7.5 percent between liking and learning.

In item 20, 78.0 percent of the low achievers do not like a strict teacher while only 60.1 percent felt that they did not learn well with a strict teacher, item 59. This is a difference of 17.9 percent.

Item 21 shows 69.7 percent of the low achievers liking science best with an easy-going teacher while only 51.4 percent of the low achievers felt that they learned science best with an easy-going teacher, as per item 60.

In item 22, 36.2 percent of the low achievers indicated that they liked science best with the teacher talking most of the time and only 28.0 percent of the low achievers felt that they learned science best with the teacher talking most of the time as per item 61. This is a difference of 8.2 percent between liking and learning for a similar item.

Item 23 shows 77.5 percent of the low achievers liking science best with the teacher going around and helping the individual student while in item 62 only 68.8 percent of the low achievers indicated that they learned science best when the teacher went around helping the individual students in the classroom.

The remaining items in Table VIII show a difference of less than 5 percent between liking and learning.

Table IX consists of the number and percentage scores in comparing the "Likes" and "Learning" for other students.

Item 1 shows 52.9 percent "agree" in favour of a regular classroom and even a greater number, 59.8 percent feel that they learn best in a regular classroom, item 43.

In item 2, 35.1 percent of the other students liked open area classrooms while only 22.7 percent of the other students considered it as a good learning environment, item 44.

There is a difference in the negative response to items 5 and 47 in liking and learning by lessons, contracts and worksheets with 37.3 percent "disagree" and 28.5 percent "disagree", respectively. This is a difference of 8.8 percent.

The other students indicated a 76.8 percent "agree" for item 8 and only a 59.5 percent "agree" to item 50. These deal with liking and learning science by means of films and filmstrips. This represents a difference of 17.3 percent between the two items.

In items 9 and 51, 87.6 percent of the other students agreed to liking science when on field trips while only 72.5 percent of the other students felt that they learned science best by means of field trips.

Items 10 and 52 show a difference of 14.5 percent with respect to liking and learning by means of library work by other students. The replies were 59.1 percent "agree" and 44.6 percent "agree",

TABLE IX

NUMBER AND PERCENTAGE COMPARISON OF THE RELATIONSHIP BETWEEN LIKES AND LEARNING FOR OTHER STUDENTS

(N = 726 STUDENTS)

	LIKES							LEARNING					
ITEM NO.	AGREE N	AGREE %	UNDECIDED N	UNDECIDED %	DISAGREE N	DISAGREE %	ITEM NO.	AGREE N	AGREE %	UNDECIDED N	UNDECIDED %	DISAGREE N	DISAGREE %
1	384	52.9	167	23.0	175	24.1	43	434	59.8	166	22.9	126	17.3
2	255	35.1	184	25.3	287	39.6	44	165	22.7	226	31.1	335	46.2
3	398	54.8	163	22.5	165	22.7	45	419	57.7	171	23.6	136	18.7
4	167	23.0	242	33.3	317	43.7	46	149	20.5	273	37.6	304	41.9
5	259	35.7	196	27.0	271	37.3	47	291	40.1	230	31.7	205	28.5
6	525	72.3	119	16.4	82	11.3	48	526	72.5	104	14.3	96	13.2
7	296	40.8	238	32.8	192	26.4	49	317	43.7	229	31.5	180	24.8
8	558	76.9	116	16.0	52	7.1	50	432	59.5	186	25.6	108	14.9
9	636	87.6	71	9.8	19	2.6	51	526	72.5	147	20.2	53	7.3
10	429	59.1	176	24.2	121	16.7	52	324	44.6	202	27.8	200	27.6
14	229	31.5	316	43.5	181	25.0	53	161	22.2	387	53.3	178	24.5
15	219	30.2	319	43.9	188	25.9	54	171	23.5	389	53.6	166	22.9
16	342	47.1	156	21.5	236	32.4	55	317	43.7	179	24.7	230	31.6
17	543	74.8	103	14.2	80	11.0	58	518	71.3	133	18.3	75	10.3
18	238	32.8	380	52.3	108	14.9	56	233	32.1	365	50.3	128	17.6
19	135	18.6	425	58.5	166	22.9	57	115	15.8	421	58.0	190	26.2
20	63	8.7	149	20.5	514	70.8	59	171	23.5	209	28.8	346	47.7
21	426	58.7	175	24.1	125	17.2	60	291	40.1	228	31.4	207	28.5
22	220	30.3	161	22.2	345	47.5	61	170	23.4	233	32.1	323	44.5
23	520	71.6	148	20.4	58	8.0	62	504	69.4	145	20.0	77	10.6

respectively, to items 10 and 52. In addition a 9.9 percent difference was expressed to items 10 and 52 in terms of "disagree".

In items 14 and 53, 31.5 percent and 22.2 percent of the other students replied "agree". This is a difference of 9.3 percent. Items 14 and 15 represent liking and learning science by means of before noon classes.

Items 15 and 54 show a 30.2 percent and 23.5 percent "agree", respectively, to liking and learning science in afternoon classes.

In items 20 and 59, the other students expressed a difference of 23.1 percent in the negative aspect with regard to liking and learning science by means of a strict teacher. The percentages are 70.8 percent and 47.7 percent "disagree", respectively.

Items 21 and 60 show a 58.7 percent and 40.1 percent "agree" response, respectively, in regard to liking and learning science with an easy-going teacher.

Item 22 indicates 30.3 percent "agree" while in 61 the other students indicated a 23.4 percent "agree". This is a difference of 6.9 percent. Items 22 and 61 deal with liking and learning in an environment where the teacher talks a lot.

The remaining items in Table IX show a difference of less than 5 percent in response between liking and learning.

Table X presents data in the form of correlation coefficients between "likes" and learning for all students as obtained from the Statistical Package for Social Sciences SPSSH-Version 6.01 to a .001 level of significance.

All the items in Table X have correlation coefficients which are greater than the .3211 correlation coefficient for a .001 level of

TABLE X

THE CORRELATION COEFFICIENTS BETWEEN LIKES AND LEARNING FOR ALL STUDENTS

ITEM NUMBERS REPRESENTING LIKES	PARALLEL ITEM NUMBERS REPRESENTING LEARNING	CORRELATION COEFFICIENTS BETWEEN LIKES AND LEARNING FOR A .001 LEVEL OF SIGNIFICANCE N = 944 STUDENTS
1	43	0.6033
2	44	0.5990
3	45	0.5581
4	46	0.6426
5	47	0.6237
6	48	0.5942
7	49	0.6259
8	50	0.5017
9	51	0.5062
10	52	0.5829
14	53	0.5250
15	54	0.5789
16	55	0.5679
17	58	0.4895
18	56	0.6160
19	57	0.6142
20	59	0.4810
21	60	0.5788
22	61	0.5901
23	62	0.5679

significance with N = 100.[1] This indicates that there is a positive correlation between likes and learning for all students as posed in question one of Problem Three.

Table XI shows that the correlation coefficients for all items are greater than the .3211 correlation coefficient for a .001 level of significance with N = 100.[2]

This would indicate that there is a positive correlation between the likes of low achievers and their sense of achievement or learning as asked in question two of Problem Three.

Table XII gives the correlation coefficients for likes and learning for other students. All the items in Table XII have correlation coefficients greater than the .3211 correlation coefficient for a .001 level of significance with N - 100.[3]

This shows that there is a positive correlation between likes and learning for the sample known as other students.

Summary

This chapter consisted of tables of values obtained from the study and the interpretation of the data in the tables. Tables I(a) - (e) to IV(a) - (e) provide data for questions one to four in Problem One. Tables V(a) - (e) and Tables VI(a) - (e) provide significant difference values for the null hypotheses in questions five to nine in Problem One.

The null hypothesis that there is no significant difference (at the 0.05 level of significance) between the male low achievers and

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[1] Sir Ronald A. Fisher and Frank Yates, Statistical Tables for Biological, Agricultural and Medical Research (New York: Hofner Publishing Company, Inc., 1953), p. 54.

[2] Ibid., p. 54.

[3] Ibid.

TABLE XI

THE CORRELATION COEFFICIENTS BETWEEN LIKES AND LEARNING FOR LOW ACHIEVERS

ITEM NUMBERS REPRESENTING LIKES	PARALLEL ITEM NUMBERS REPRESENTING LEARNING	CORRELATION COEFFICIENTS BETWEEN LIKES AND LEARNING FOR A .001 LEVEL OF SIGNIFICANCE N = 218 STUDENTS
1	43	0.5271
2	44	0.5240
3	45	0.4914
4	46	0.6729
5	47	0.6085
6	48	0.5673
7	49	0.6880
8	50	0.4789
9	51	0.4206
10	52	0.5655
14	53	0.6356
15	54	0.6476
16	55	0.5906
17	58	0.5606
18	56	0.7025
19	57	0.6398
20	59	0.4760
21	60	0.5285
22	61	0.5753
23	62	0.6229

TABLE XII

THE CORRELATION COEFFICIENTS BETWEEN LIKES AND LEARNING FOR OTHER STUDENTS

ITEM NUMBERS REPRESENTING LIKES	PARALLEL ITEM NUMBERS REPRESENTING LEARNING	CORRELATION COEFFICIENTS BETWEEN LIKES AND LEARNING FOR A .001 LEVEL OF SIGNIFICANCE N = 726 STUDENTS
1	43	0.6354
2	44	0.6241
3	45	0.5809
4	46	0.6302
5	47	0.6274
6	48	0.5997
7	49	0.6066
8	50	0.5044
9	51	0.5313
10	52	0.5850
14	53	0.4939
15	54	0.5538
16	55	0.5598
17	58	0.4681
18	56	0.5929
19	57	0.6057
20	59	0.4798
21	60	0.5887
22	61	0.5938
23	62	0.5572

male other students was significant for items 4, 10, 11, 13, 37, 38, and 48.

The null hypothesis that there is no significant difference (at the 0.05 level of significance) between the female low achievers and female other students was rejected for items 1, 11, 20, 21, 27, 37, 39, 42, 43, 44, 48, 50, 51, 58, and 64.

The null hypothesis that there is no significant difference (at the 0.05 level of significance) between the low achievers and other students for grade 7 was rejected for items 1, 4, 6, 8, 10, 19, 21, 25, 27, 28, 38, 39, 42, 44, 60, and 63.

The null hypothesis that there is no significant difference (at the 0.05 level of significance) between the low achievers and other students for grade 8 was rejected for items 2, 15, 50, 59, and 64.

The null hypothesis that there is no significant difference (at the 0.05 level of significance) between the low achievers and the other students for grade 9 was rejected for items 11, 47, 61, 63, and 64.

Tables VII, VIII, and IX contain comparison scores between likes and learning for questions one, two, and three of Problem Two. Tables X, XI, and XII contain correlation coefficients for the comparison scores between likes and learning for questions one to three of Problem Two.

CHAPTER V

CONCLUSION

This chapter will cite the major needs as stated by the students in the study with respect to: the learning environment, methods of instruction, attitudes toward science, the science curriculum content and opinions with respect to science. The chapter consists of findings, interpretation of findings and recommendations with respect to the findings for the questions posed in Problems One and Two of the study. The chapter ends with implications with respect to the study and a summary.

Major Findings

The Environment

Neither the low achievers nor the other students approved (over 50%) of the recent innovations, that of large classrooms or open areas. This is shown in item 2 in Table II(a). Only 43.6 percent of the low achievers and 35.1 percent of the other students replied in the affirmative. This rejection of the open area was further substantiated by data from item 44 of Table II(a). "You learn science best when it is taught in a large classroom (open area)." To item 44, 31.6 percent of the low achievers and 22.7 percent of the other students replied "agree". Data in the study show that the regular classroom type of learning environment has a place in our modern schools.

In Table II(a), 50.9 percent of the low achievers and 52.9 percent of the other students indicated that they liked science best when it was taught in a regular classroom setting.

Both the low achievers and the other students surpassed the 50 percent criteria in indicating a need for field trips.

It was found that 68.8 percent of the low achievers and 59.1 percent of the other students expressed a need to work in the library. However, 52.3 percent of the low achievers said that they learned science best when allowed to work in the library while only 44.6 percent of the other students felt that they learned science best while in the library.

Instruction

Data show several major needs as expressed by low achievers and other students with regard to methods of instruction. Both the low achievers, 53.7 percent, and the other students showed a major need for the teacher to present lessons in front of the class.

Data show class discussions as a major need by both the low achievers, 74.3 percent, and the other students, 72.3 percent. Another major need with respect to methods of instruction was the use of films and filmstrips; 85.3 percent of the low achievers and 76.9 percent of the other students replied "agree" to this item.

Data show that 77.5 percent of the low achievers and 71.6 percent of the other students showed a definite need for the teacher to help students on an individual basis.

An innovation introduced to Manitoba schools during the sixties, that of teaching by contracts, was rejected by both the low achievers and the other students. Only 44.5 percent of the low achievers and 43.7 percent of the other students replied "agree" to this item.

Curriculum

Several major needs were established by the low achievers and the other students with respect to curriculum. Both the low achievers, 68.8 percent and the other students 75.8 percent, replied "agree" to a need to learn about living things.

A major need was set by both the low achievers, 57.8 percent and other students 61.2 percent, for the study of astronomy in the junior high curriculum.

Paleontology appears to be a major need of junior high students. To paleontology as a need, 55.0 percent of the low achievers and 57.0 percent of the other students replied "agree" to this item.

Learning about foods and nutrition is another major need of junior high students, 56.0 percent of the low achievers and 58.5 percent of the other students replied "agree" to this item.

Neither the low achievers nor the other students appeared to be interested in home heating systems; 29.8 percent of the low achievers and 27.6 percent of the other students replied "agree" to this item.

Few students showed an interest in growing food, a basic necessity of life. With respect to growing food, 42.2 percent of the low achievers and 41.5 percent of the other students replied "agree" to this item.

Student Age versus Liking Science

The students' appreciation and liking for science appears to decrease with an increase in the student age. Data show that 47.7 percent of the low achievers and 47.4 percent of the other students liked science in elementary school while only 42.6 percent of the low ach evers and 46.7 percent of the other students replied "agree" when asked if they liked science now. Only 33.0 percent of the low achievers and 40.4 percent of the other students looked forward to taking science in grades 10 to 12.

General

Only approximately half of the junior high students feel that science will be of use to them once they leave school.

It is encouraging to note that 44.1 percent of the low achievers and only 30.0 percent of the other students felt that science should be made optional at the junior high level.

The findings indicate that generally there is no great disparity between the needs of low achievers and that of the other students. Only in a few instances do the findings support the null hypotheses: that there is no difference between the low achievers and the other students as posed in questions five to nine in Problem One.

Male Low Achievers versus Male Other Students

The null hypothesis: that there is no difference between the low achievers and the other students in terms of males is supported only in the following items: liking science best by means of contracts, working in the library, liking science now, looking forward to taking science in grades 10 to 12, liking to learn about growing food, and liking to learn about food preparation.

Female Low Achievers versus Female Other Students

The null hypothesis: that there is no difference between the low achievers and the other students in terms of females showed a slightly greater support consisting of seventeen items. These were liking science when taught in a regular classroom, liking science now, liking science best with a strict teacher, liking science best with an easy-going teacher, liking to learn about rocks and minerals, liking to learn about growing food, liking to learn about the environment, making science optional at the junior high level, learning science best in a regular classroom, learning science best in a large (open area) classroom, learning science best with class discussions, learning science by means of films and filmstrips, learning science best when on field trips, learning science best by doing experiments, learning science best with a strict teacher, learning science best with an easy-going teacher, and understanding ideas in the science course.

Grade Seven Differences

The null hypothesis: that there is no difference between the low achievers and the other students in terms of grade 7's was supported in 16 of the 65 items. These were liking science best in a regular classroom, liking science best when presented by contracts, liking science best when there are class discussions, liking science best when presented by films and filmstrips, liking science best when allowed to work in the library, liking science best with a woman science teacher, liking science best with an easy-going teacher, liking to learn about living things, liking to learn about rocks and minerals, liking to learn about astronomy, liking to learn about food preparation, wanting to study the environment, opinions about making science optional in junior high, learning science best when it is taught in a regular classroom, learning science best with an easy-going teacher, and opinions as to whether the present science course is too difficult to read and follow.

Grade Eight Differences

The null hypothesis: that there is no significant difference (at the 0.05 level of significance) in grade 8 between the low achievers and the other students was supported only in 5 of the 65 items. These items were as follows: liking science best when taught in a large classroom (open area), liking science best in afternoon classes, learning science best in the presence of a strict teacher, and understanding most of the concepts in the science course.

Grade Nine Differences

In terms of grade 9, the null hypothesis: that there is no difference between the low achievers and the other students was supported in 5 items. These items consisted of: liking science now, learning science best when it is presented by a mixture of lessons, contracts, and worksheets, learning science best when doing experiments, opinions on whether the present science course is too difficult to read and follow, and understanding most of the concepts in the science course.

Correlations

The correlation coefficients show that there is a positive correlation between likes and learning for all the students, the low achievers and the other students. This would indicate that the student knows what he likes and that furthermore the student feels that he learns what he likes. These results would seem to support the statements by Crawford[1] that meaningfulness of materials promotes learning which is further supported by Robinson.[2]

Order of Self-Expressed Needs

The Learning Environment

The order of self-expressed needs with respect to the learning environment is as follows: The greatest need is for field trips. The second greatest need was learning science best when on field trips. The third greatest need in the learning environment was a need for an easy-going teacher. These three items were followed by a need for library work. A need for a regular classroom learning situation was fifth. The last three greatest needs were for learning in the library, learning science best with an easy-going teacher, and liking science best in a regular classroom.

The order of least needs with respect to the learning environment by the low achievers and the other students was as follows: a

[1] Crawford, op. cit., p. 5.

[2] Robinson, op. cit., p. 1.

need for a strict teacher, and learning science in the presence of a strict teacher.

Instruction

With respect to the methods of instruction the order of self-expressed needs consisted of the greatest need being for films and filmstrips, a need for the teacher helping students on an individual basis was second, and a need for class discussion came third. These three were followed by learning science best by class discussions, a need for student involvement in experiments, a need for teacher helping students on an individual basis learning situation, a need for teacher taught lessons in front of the class, and a need for teacher demonstrated experiments. The foregoing data is from Table II(b).

Methods of Instruction

Table II(b) shows that the least required need with respect to the methods of instruction was the teacher talking too much. This was followed by a need for contracts.

The Curriculum

The order of needs with respect to the science curriculum content as shown in Tables II(d) shows the greatest need to learn about living things. This is followed by a need to learn about motors. The third need is for astronomy in the junior high curriculum. A need to learn about foods and nutrition comes fourth. This was followed by a need for the study of fossils in the curriculum, a need to learn about electricity, and learning about chemistry.

The least need on the curriculum was shown for learning about heating systems. This was followed by a need for learning about food preparation.

The wide range of interest in various science topics shown by the study would seem to support Hurd's[1] statement that there is no simple solution to setting a curriculum.

Interpretations of the Findings

Both the low achievers and the other students rejected the open area concept in the learning environment. This would indicate that the large (open area) classroom is not the ideal form of learning environment as far as the student is concerned.

However, both the low achiever and other student preferred the regular classroom type of learning environment. Field trips were sought after by both groups. However, it may well be that many students think a field trip is a holiday away from classes rather than a learning situation.

A need for library work was shown by 68.8 percent of the low achievers and 59.1 percent of the other students. However, only 44.6 of the other students felt that they learned science best while in the library. It may be that the low achiever prefers to go to the library to get away from the frustrations and confrontations of the classroom.

According to the student, the traditional method of instruction,

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[1]Hurd, op. cit., p. 95.

that of the teacher presenting a lesson to the class is acceptable. The student also feels that the teacher helping students on an individual basis method of instruction is required in the schools covered by the study.

Audio visual means of instruction was accepted by the student.

Teaching by contracts has its limitations according to the students. Teachers who tend to teach by means of contracts should make sure that this method is suitable for that particular group of students. Contract teaching may be suitable for a particular class or a particular topic. However, the study would seem to indicate that care must be taken that contract teaching is not the only means of instruction. Curtes[1] says that the curriculum must be of such a nature as to allow the student to achieve his own potentiality. Contract teaching may not allow some students to achieve their potentialities.

With respect to curriculum, the study indicates an interest in a wide range of topics by the junior high students. This would indicate that the junior high course should consist of a wide range of topics for the teacher and class to choose from.

The student's appreciation and liking for science decreases with increase in student age. It may be that the junior high student has the wrong concept of what science is and the part that science plays in everyday life. Junior high students may feel that science is of no use to a person unless that person plans on becoming a scientist.

[1] Curtes, op. cit., p. 1.

Only approximately half of the junior high students felt that science will be of use to them once they leave school. This is probably due to the student not being made sufficiently aware of the part that science plays in their everyday lives.

Recommendations

Both the low achievers and the other students rejected the large classroom (open area) learning environment. This would indicate that school administrators should have reservations about knocking down existing walls to make room for open areas. Architects who design future schools should limit the amount of space for the open area type of classroom.

Since the study was limited to the Winnipeg junior high schools, we cannot generalize, therefore, that the concept of open area classroom would be rejected by the suburban junior high school student population or the rural junior high student population. According to Champagne and Albert,[1] there are differences between communities and the needs of their children. Therefore, it would be advisable for a particular school board to find out from the community its opinion on the open area learning environment when constructing new schools or remodelling existing schools.

This is reported by Sperry[2] and the Illinois State Commission on Urban Education that the feeling of the community could be obtained from the self-expressed needs of the students. Also that the curriculum

[1] Champagne and Albert, op. cit., p. 16

[2] Sperry, op. cit., p. 3.

should be relevant to that particular community.

The study showed that the regular type of learning environment has a place within Winnipeg schools. Thus school administrators, principals, and teachers should consider the traditional classroom as a suitable learning environment. This may not be true for other school divisions.

The study indicates that planned field trips, relating to certain subject material should be an important part of a junior high science curriculum. One suggestion would be to have a test and an assignment based on the field trip. This would discourage the student from treating a field trip as a day away from classes.

Since the students sampled showed a wide interest in curriculum, one recommendation would be to have as wide a spectrum of topics to choose from as possible at the junior high level. This is supported by Ford[1] who says that in order for the curriculum to be relevant to the pupil the needs of the pupil must be taken into account. Furthermore, Bruner[2] suggests the idea of evaluating the curriculum before implementing it.

One recommendation is that biology should be a specific part of the junior high science curriculum. Another recommendation would be for paleontology at the junior high level. Basic nutrition should be on the junior high curriculum, whereas neither the low achievers nor the other students appeared to be interested in home heating systems, and

[1]Ford, op. cit., p. 5.

[2]Bruner, op. cit., p. 30.

whereas rising of energy costs and energy shortages are a fact of life, it is recommended that heating systems, energy conservation, and insulation become part of the junior high science curriculum. There was a lack of interest shown in the growing of food, a basic necessity of life. One recommendation would be to include the various plant families and their cultivation in the junior high science curriculum.

The study shows that the student's appreciation and liking for science decreases with an increase in the student age. The study revealed also that only 33.0 percent of the low achievers and 40.4 percent of the other students looked forward to taking science in grades 10 to 12.

One recommendation would be for junior high science teachers to show their students that the study of science is not only for those people who intend to become scientists. Students ought to be made aware of the role that science plays in their lives. They ought to be made aware that science can be studied and appreciated by people who do not intend to become scientists.

More emphasis must be placed on the usefulness of science to the ordinary layman since only approximately 50 percent of the junior high students felt that science would be of no use to them upon leaving school.

Data from the study supports science as being compulsory in the junior high curriculum.

Summary

The discussions in this chapter consisted of discussion of the findings by the study of the needs of students in the Winnipeg School Division schools with respect to the learning environment, methods of instruction, attitude toward science, science curriculum content, and opinions about science. This was followed by interpretations of the findings and finally by recommendations.

The study showed that the students rejected open area classrooms and contract teaching. The study also indicates that there is a wide range of interest in science topics at the junior high level. The study showed that there is no great difference between the needs of low achievers and that of other students. The study further indicated that the student felt, in many instances, that the science course content would not be of any value to him in the future. The study also supports the concept that when the material that the student likes and feels is relevant, then this material is learned by the student.

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APPENDIX A

1. Check one:

   a) I am in 7th grade ____ ; 8th grade _____; 9th grade ______.

   b) I am a boy _____; a girl _____.

2. Instructions for marking answers:

   1. On the following pages there are positive statements relating to SCIENCE as a subject in school with respect to course content, methods of instruction, equipment, rooms, etc.

   2. If you AGREE with the statement, circle the number 1; if you are UNDECIDED about the statement, circle number 2; if you DISAGREE with the statement, circle number 3.

   3. Answer every item. There will be one number circled for each item -- either number 1 under AGREE, or number 2 under UNDECIDED, or number 3 under DISAGREE

   4. If you do not understand a word or a whole item, raise your hand and the teacher will help you.

QUESTIONNAIRE

- 1 -

TIMES WHEN YOU LIKE SCIENCE BEST	AGREE	UNDECIDED	DISAGREE
1. You LIKE science best when it is taught in a regular classroom.	1	2	3
2. You LIKE science best when it is taught in a large classroom (open area).	1	2	3
3. You LIKE science best when your teacher teaches lessons in front of the class.	1	2	3
4. You LIKE science best when it is presented by contracts.	1	2	3
5. You LIKE science best when it is taught by a mixture of lessons, contracts and worksheets.	1	2	3

TIMES WHEN YOU LIKE SCIENCE BEST	AGREE	UNDECIDED	DISAGREE
6. You LIKE science best when you have class discussions, with the teacher and the students taking part.	1	2	3
7. You LIKE science best when you have small group discussions (seminars).	1	2	3
8. You LIKE science best when you have films and filmstrips.	1	2	3
9. You LIKE science best when you go on field trips.	1	2	3
10. You LIKE science best when you are allowed to work on your own in the library, etc.	1	2	3
11. You LIKE science now!	1	2	3
12. You LIKED science in elementary school.	1	2	3
13. You are looking forward to taking science in grades 10 - 12.	1	2	3
14. You LIKE science best when you have classes before noon.	1	2	3
15. You LIKE science best when you have classes in the afternoon.	1	2	3
16. You LIKE science best when the teacher does demonstration experiments and gives you the results (data) to explain and write up.	1	2	3
17. You LIKE science best when you do the experiments yourself or with a group of students, get your own results (data) and write these results up with explanations.	1	2	3

TIMES WHEN YOU LIKE SCIENCE BEST	AGREE	UNDECIDED	DISAGREE
18. You LIKE science best when you have a man for your science teacher.	1	2	3
19. You LIKE science best when you have a woman for your science teacher.	1	2	3
20. You LIKE science best when you have a strict teacher.	1	2	3
21. You LIKE science best when you have an easy-going teacher.	1	2	3
22. You LIKE science best when the teacher talks most of the time.	1	2	3
23. You LIKE science best when the teacher goes about the room helping individual students.	1	2	3
24. You LIKE science best when you do well on a test.	1	2	3

THINGS YOU WOULD LIKE TO LEARN ABOUT IN SCIENCE	AGREE	UNDECIDED	DISAGREE
25. You would like to learn about living things.	1	2	3
26. You would like to learn about electricity.	1	2	3
27. You would like to learn about rocks and minerals.	1	2	3
28. You would like to learn about the sun, stars, moon, comets and other heavenly bodies.	1	2	3
29. You would like to learn about insects.	1	2	3

THINGS YOU WOULD LIKE TO LEARN ABOUT IN SCIENCE	AGREE	UNDECIDED	DISAGREE
30. You would like to learn about chemicals and chemical reactions.	1	2	3
31. You would like to learn about gasoline and electric motors.	1	2	3
32. You would like to learn about fossils and life in the past.	1	2	3
33. You would like to learn about things in science which apply to your community, e.g., water supply, sewage treatment.	1	2	3
34. You would like to learn about things in science which will help you select the right kinds of foods for proper nutrition.	1	2	3
35. You would like to learn in science how the human body makes use of food supplied to it and removes waste.	1	2	3
36. You would like to learn about heat and the various home heating systems.	1	2	3
37. You would like to learn how food is grown.	1	2	3
38. You would like to learn in science how food is prepared.	1	2	3
39. You would like to study about your surroundings (environment).	1	2	3

YOUR OPINIONS ABOUT SCIENCE	AGREE	UNDECIDED	DISAGREE
40. You feel what you are learning in science is of use to you NOW.	1	2	3
41. You feel what you are learning in science now will be of use to you WHEN YOU LEAVE SCHOOL.	1	2	3
42. You feel science should be made OPTIONAL in junior high.	1	2	3

TIMES WHEN YOU LEARN SCIENCE BEST	AGREE	UNDECIDED	DISAGREE
43. You LEARN science best when it is taught in a regular classroom.	1	2	3
44. You LEARN science best when it is taught in a large classroom (open area).	1	2	3
45. You LEARN science best when the teacher teaches lessons in front of the class.	1	2	3
46. You LEARN science best when it is presented by contracts.	1	2	3
47. You LEARN science best when it is taught by a mixture of lessons, contracts and worksheets.	1	2	3
48. You LEARN science best when you have class discussions, with the teacher and students taking part.	1	2	3
49. You LEARN science best when you have small group discussions (seminars).	1	2	3
50. You LEARN science best when you have films and filmstrips.	1	2	3

TIMES WHEN YOU LEARN SCIENCE BEST	AGREE	UNDECIDED	DISAGREE
51. You LEARN science best when you go on field trips.	1	2	3
52. You LEARN science best when you are allowed to work on your own in the library, etc.	1	2	3
53. You LEARN science best when you have classes before noon.	1	2	3
54. You LEARN science best when you have classes in the afternoon.	1	2	3
55. You LEARN science best when the teacher does demonstration experiments and gives you the results (data) to explain and write up.	1	2	3
56. You LEARN science best when you have a man for your science teacher.	1	2	3
57. You LEARN science best when you have a woman for your teacher.	1	2	3
58. You LEARN science best when you do the experiments yourself or with a group of students, get your own results (data) and write these results with explanations.	1	2	3
59. You LEARN science best when you have a strict teacher.	1	2	3
60. You LEARN science best when you have an easy-going teacher.	1	2	3
61. You LEARN science best when the teacher talks most of the time.	1	2	3
62. You LEARN science best when the teacher goes about the room helping individual students.	1	2	3

TIMES WHEN YOU LEARN SCIENCE BEST	AGREE	UNDECIDED	DISAGREE
63. You feel that your present science course is too difficult to read and follow.	1	2	3
64. You understand most of the ideas (concepts) in your science course.	1	2	3
65. You memorize the ideas (concepts) most of the time in your science course.	1	2	3

66. How do you feel toward science after receiving a low test mark?

____

____

67. Can you recall anything the teacher has done which has turned you ON or has turned you OFF in science? If so, write a few words about it.

____

____

68. In a few words tell why you LIKE or DO NOT LIKE science.

____

____

APPENDIX B

THE WINNIPEG SCHOOL DIVISION NO. 1
1577 Wall Street East, Winnipeg, Manitoba R3E 2S5

November 28, 1973.

To: Principals of Gordon Bell, Hugh John Macdonald, General Wolfe, Aberdeen and St. John's.

From: Murray R. Smith, Assistant Superintendent.

Re: Research Project in Science Curriculum.

This will confirm that Metro Kowalik's research project in junior high science curriculum has been approved by the inter-university research committee and by this office. Mr. Kowalik, for those who may not already know him, was on Gordon Bell staff for several years and is presently on leave of absence.

If acceptable to you and practical for your staff and students, you should feel free to cooperate in this study. There are two parts to Mr. Kowalik's work and it might be reasonable to assist with one and not the other.

APPENDIX C

Questionnaire A

1. You like science now.

2. You liked science in grades 4 - 6.

3. You would like to take science in grades 10 - 12.

4. You feel what you have learned in science is of use to you now, that is, your interests are being fulfilled.

5. You feel what you are learning about science now will be of use to you when you leave school.

6. You feel science should be made optional in junior high.

Questionnaire B

1. You would like to learn about living things.

2. You would like to learn about the sun, stars, moon comets, and other heavenly bodies.

3. You would like to learn about electricity.

4. You would like to learn about rocks and minerals.

5. You would like to learn about insects.

6. You would like to learn about chemicals and chemical reactions.

7. You would like to learn about gasoline and electric motors.

8. You would like to learn about fossils and life in the past.

9. You would like to learn about things in science which apply to your community, e.g., water supply, sewage treatment.

10. You would like to learn about things in science which will help select the right kinds of foods for proper nutrition.

11. You would like to learn in science how the human body makes use of food supplied to it and removes waste.

12. You would like to learn in science about different heating systems

13. You would like to learn in science how food is grown.
14. You would like to learn in science how food is processed.
15. You would like to study about your surroundings (environment).
16. You would like to study about heat.

Questionnaire C

1. You would like to have a man for your science teacher.
2. You would like to have a lady for your science teacher.
3. You prefer a strict teacher with good discipline.
4. You prefer an easy-going teacher.
5. You prefer your science teacher to always teach lessons in front of the class.
6. You would like to be taught science in a small classroom by one teacher.
7. You would like to be taught science in a large classroom (open area).
8. You would like to study science by mostly contracts.
9. You would like to study science by a mixture of contracts, work sheets and lessons.
10. You would like the teacher to do demonstration experiments and give you the results (data) to explain and write up.
11. You would like to do the experiments yourself or with a group of students, get your own results (data) and write these results up with explanations.
12. You would like to have class discussion in science, the teacher and entire class to participate.
13. You would like to have small group discussions in science.
14. You feel that you learn something from class discussions.
15. You feel that your present science course is too difficult to read and follow.

16. You understand most of the time the ideas (concepts) in your science course.

17. You memorize the ideas (concepts) most of the time in your science course.

18. You like filmstrips and films in science.

19. You feel you learn something from the science filmstrips and films.