1981

Assessment of the science programs in the elementary schools of Area Six

Paul Eckerman
University of Northern Iowa

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Abstract

A new generation of scientifically literate citizens is needed to cope with a future characterized by rapid change and a complex set of technical and ethical questions. Accordingly, it is recommended that all students receive an appropriate education in science to develop the intellectual skills that are basic to critical observation problem resolution, decision-making and valuing. The elementary science student of today lives in a science-oriented culture. He/she needs a science curriculum designed to be adequate in concept and purpose to face his future in the scientific-technological-industrial society. The goals of the elementary science curriculum must keep pace with the rapid change in science and its application in technology. The organization and sequencing of the curriculum must aid a student to sense structure in order to acquire appropriate learnings. This would support Piaget's findings that understandings by students result from interaction of a new experience with his recollection of previous ones.

AN ASSESSMENT OF THE SCIENCE PROGRAMS IN THE ELEMENTARY SCHOOLS OF AREA SIX

A Research Paper

Presented to

the Department of School Administration

and Personnel Services

University of Northern Iowa

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts in Education

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by

Paul Eckerman

May 1981

This Research Paper by: Paul Eckerman

Entitled: AN ASSESSMENT OF THE SCIENCE PROGRAMS IN THE ELEMENTARY SCHOOLS OF AREA SIX

has been approved as meeting the research paper requirement for the Degree of Master of Arts in Education.

Norman McCumsey

4/9/81
Date Approved

Director of Research Paper

Norman McCumsey

4/9/81
Date Received

Graduate Faculty Adviser

Donald L. Hanson

April 9, 1981
Date Received

Head, Department of School Administration and Personnel Services

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Chapter 1

INTRODUCTION

A new generation of scientifically literate citizens is needed to cope with a future characterized by rapid change and a complex set of technical and ethical questions. Accordingly, it is recommended that all students receive an appropriate education in science to develop the intellectual skills that are basic to critical observation problem resolution, decision-making and valuing.

The elementary science student of today lives in a science-oriented culture. He/she needs a science curriculum designed to be adequate in concept and purpose to face his future in the scientific-technological-industrial society. The goals of the elementary science curriculum must keep pace with the rapid change in science and its application in technology. The organization and sequencing of the curriculum must aid a student to sense structure in order to acquire appropriate learnings. This would support Piaget's findings that understandings by students result from interaction of a new experience with his recollection of previous ones.

Statement of the Problem

Science education in the nation's schools has undergone some major changes in the last twenty years. The rapidity with which these changes have occurred has made it difficult for schools and teachers to adjust their local science curriculum to changes in students' and society's needs.

The purpose of this study was to evaluate the programs in Area VI community school districts, grades four, five and six.

Importance of the Study

Science is an essential ingredient in the total education process. Since we live in a scientific/technological society, science must occupy a place of prominence in the total curriculum.

Science education is the study of the processes of investigation, the knowledge such investigations provide, and the impact and use of such knowledge upon the individual and society. As such, science education should be viewed as a means of assistance with scientific enlightment - the transmission of useful knowledge and skills.

The science curriculum and staff serve as interpreters of scientific information, theories, and research. As such they serve as the bridge between society (the public) and science (the scientists). They must reflect the nature of science, recent advances in science, and the societal pressure which affect both science and education. They must consider the personal needs of students and the societal issues of the time as they interpret science education in a manner necessary for a citizenry which is scientifically literate.

Conscientious teachers want to know how well they do. They want to identify the strengths and weaknesses of their programs of instruction. Curricula, content, and methods of instruction in the elementary science have been, and are, changing rapidly. This stems, at least in part, from technological competition between advanced nations.

Evaluation and re-evaluation of science curricula is an important and continuous operation. It is essential for individuals working together on curriculum to agree on the target in order to work effectively together. Modification of a science curriculum as a result of, and appraisal by, instructors should lead to a program of instruction better able to meet the needs of the students.

This research paper is an evaluation of the science programs in all schools that lie within the confines of the Area VI District. It included only the students enrolled in grades four, five, and six.

Procedure

The purpose of this study was to assess the science programs in the intermediate grades of the schools of the Area VI schools, when compared with established criteria of adequacy. Those persons of the Area VI Schools directly responsible for science instruction were the persons interviewed. A personal data sheet and a questionnaire were mailed to the teachers involved to obtain the desired data. Information then was tabulated on a checklist secured from the Iowa Department of Public Instruction.

The Instrument

Those persons of the Area VI Community Schools directly responsible for science instruction assessed and evaluated the program of science instruction in their intermediate grades. To assess and evaluate any functioning program a type of "yardstick" was needed. A checklist for assessing a program of science was secured from the Department of Public Instruction State of Iowa.

The personal data sheet was prepared for the purpose of obtaining data regarding staff preparation in the area of science. A questionnaire was prepared for the purpose of obtaining feedback regarding science curricula and practices from those interviewed instructors who taught in the Area VI Community Schools during the year 1980-1981. This information then became the basis for data recorded on the checklist.

Selection of Population and Sample

The population for this study consisted of the science instructors of the Area VI School Districts, teaching science in grades four, five, and six. In this sample of science programs in elementary schools of Area VI, some of the instruction was carried out in departmentalized situations, but most of the classes in the smaller schools were carried out in self-contained classrooms.

Collection of the Data

The instruments, a personal data sheet and a questionnaire, were presented to all the principals of the Area VI schools. A brief explanation was sent to the principals asking them to distribute the materials to their teachers. There was a brief explanation on the questionnaire requesting that each instructor supply information as to how he perceived the present program of science instruction in their particular school system.

Chapter 2

REVIEW OF RELATED LITERATURE

Our society values technological achievement. Education hears the plea for "more science!" Our future may be determined by wise use of science and technology. The discipline of pure science is interested only in discovery of the truth. Technology takes these discoveries and applies them. It encompasses the entire spectrum, beginning with development, production, sales, and distribution.

A reform movement now shifts emphasis to the science processes and content, in order to develop science literacy based on direct study of the natural world. Systematic description and explanation of natural phenomena become the desired outcome of our instructional program. This is the viewpoint taken by Hurd as he further points up that the focus should be on science rather than technology, in order that students will move toward attainment of the objectives of science education.[1]

Hurd cites:

> The emerging scientific revoluation, together with the trend toward world industrialization, demands a program of science education with new dimensions. More than a casual acquaintance with scientific enterprise is essential for effective citizenship. It is apparent now is the time to evaluate and redefine the purposes of science teaching.[2]

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[1] Paul DeHart Hurd, "Science Education for Changing Times," Rethinking Science Education, 59th Yearbook of the National Society for the Study of Education, Part I (Chicago: University of Chicago, 1969), p. 18.

[2] Ibid., p. 18.

Michaelis, Grossaman, and Scott agree:

> The reform movement in science education has been characterized by a shift in emphasis rather than by a drastic restatement of purposes of science education. In the past, emphasis was placed on technological applications of science and on the content of science. Currently, emphasis is given to the study of science qua science, and the content and process are intertwined.[3]

Hurd further states:

> An important process in planning and developing science curriculum is that of identifying its purposes. These become the objectives that orient the teacher's efforts and define the responsibilities of the learner. Objectives indicate the nature of the educational endeavor and denote the direction it should take; they serve as a guide for the choice of teaching procedures and provide hypothesis for making curriculum decisions. They suggest to the teacher why his work is important, how to plan it, and how to evaluate it. Only when objectives are clearly identified and supported by a personal loyalty can the teacher maximize his efforts in the learning process.[4]

Michaelis would move students toward attainment of the following objectives:

1. Scientific literacy based on a functional understanding of scientific concepts and methods of inquiry.

2. Increased competence in examining, analyzing, and understanding the world and a desire to continue to develop this competence.

3. Understanding and appreciation of both the products and processes of science.

4. Enhanced competence in evaluating and applying knowledge obtained through scientific modes of inquiry.

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[3] John U. Michaelis, Ruth H. Grossaman, Floyd F. Scott, New Designs for the Elementary School Curriculum (New York: McGraw-Hill Book Company, 1977), p. 203.

[4] Hurd, op. cit., p. 18.

5. Insight into science as a creative enterprise in which continual discovery of new knowledge is emphasized.

6. Such attitudes and appreciations as thoughtful skepticism, suspended judgment, intellectual honesty and curiosity, respect for empirical inquiry, and appreciation of the contributions of scientists to our cultural heritage.

7. Ability to apply scientific modes of inquiry to other intellectual pursuits where their use is appropriate.

8. Improved skill in making judgments and in discriminating among values through the use of processes of rational inquiry.

9. Ability to observe, understand, and deal with the natural environment.

10. Insight into the interrelationships of science and other areas of human experience.

11. Interests in science which may carry over into leisure-time activities.[5]

If these broad objectives are to become a part of planning and evaluation of curriculum, they will need to be stated behaviorally. Subject matter must assume logical structure, this structure must be understood by the elementary teacher who first introduces the area, as well as the succeeding instructors. Bruner suggests the four advantages of emphasizing the fundamental structure of a subject:

1. Understanding fundamentals makes a subject more comprehensible.

2. Unless detail is placed into a structured pattern, it is rapidly forgotten.

3. An understanding of fundamental principles and ideas appears to be the main road to adequate "transfer of training."

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[5]Michealis, op. cit., pp. 203-204.

4. By constantly re-examining material taught in elementary and secondary schools for its fundamental character, one is able to narrow the gap between "advanced" knowledge and "elementary" knowledge.[6]

The planning dimensions are many. The criteria for the selection of general objectives of science education should be:

1. Inclusive of the total purpose of science education.

2. Equally applicable in all grades and in all science disciplines.

3. Few enough to be remembered by the teacher.

4. Stated so they are understandable.

5. Capable of sufficiently objective evaluation to provide useful feedback.[7]

If a program of elementary science is to make a difference in the lives of children, in light of all the goals, objectives, and guidelines previously stated, then the program must undergo constant scrutiny. A committee, Blough, Blackwood, Hill and Schwartz, stated:

> Planning for the evaluative process must also be an integral part of the program in elementary science. This process must not be left to change, to be considered in a cursory manner every few years by a committee of teachers. Ongoing and thorough examination of the science program should be considered part of an educator's responsibility, and there should be adequate provision for meeting this responsibility.[8]

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[6]Jerome S. Bruner, The Process of Education (Cambridge, Massachusetts: Harvard University Press, 1960), pp. 23-26.

[7]Donald Strotler, John S. Richardson, and Stanley Williamson. The Supervision of School Science Programs. (Columbus, Ohio: Charles E. Merrill Books, Inc., 1976), p. 48.

[8]Glen O. Blough, Paul E. Blackwood, Kathern E. Hill, and Julius Schwartz (Comm.), (Chapter 7 of 59th Yearbook, Part I., of National Society for the Study of Education, cited in:) Edward Victure and Marjorie S. Lerner, Readings in Science Education for Elementary School (New York: Macmillan Company, 1972), p. 165.

Assessments of instructional programs of science many times lead to redefinition of objectives and goals, or better yet establishment of new goals which can lead to further experimentation with new subject matter or teaching methods. Professor Bruner stated: "Something new was stirring in the land."[9] The efforts of leading physicists, mathematicians, biologists, and chemists in launching new curriculum designs were seen in the early 1970.

Attention should be given by instructors so that students do have a chance to develop other dimensions of the structuring movement, namely the methods of inquiry. Teachers need to ask, have we planned experiences that have developed the student's ability to think about problems that in turn develop an intuitive kind of guessing. Emphasis is then placed upon the process of getting the relevant data and its relationship to the decisions that students will make.

This new emphasis demands a rethinking or assessment of present traditional approach to teaching in order to determine if students have the opportunity to achieve that kind of learning essential to cope with our technological revolution in knowledge.

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[9]Bruner, op. cit., pp. vii and viii.

Chapter 3

REPORT OF THE STUDY

The tabulation of the responses and other factual data were recorded on the assessment checklist that was secured from the Iowa Department of Public Instruction. A copy of the personal data sheet is shown in Appendix A. A copy with the tabulated results of the personal data sheet is also shown. The questionnaire, along with the tabulated results, is shown in Appendix B. The results of the questionnaire were then graphed to depict the apparent matching of local science curriculum needs to available science programs offered in the Area VI elementary schools.

Personal Data Sheet

The personal data sheet that accompanied the questionnaire, (See Table I, page 13) was used to gain insight into the background of the people teaching science at the elementary level in Area VI elementary schools.

There were fourteen questions on the personal data sheet. The first question asked about the present position of the people answering the data sheet. Ninety-four percent were teachers in grades kindergarten through six. Five percent were filled in by elementary principals.

Question two asked about the present age of the respondents. Thirty-eight percent were between the ages of twenty and twenty-nine.

Twenty-two percent were between the ages of thirty and thirty-nine. Seven percent were between the ages of forty and forty-nine. Twenty percent were between fifty and fifty-nine and five percent were over fifty years of age.

Question three asked about the sex of the respondent. Seventy-two percent were females and twenty-three percent were males.

Thirty-one percent were between their first and fourth year of teaching. Sixteen percent were between their fifth and ninth year, while twenty-five percent were between ten and fourteen years. One percent were between fifteen and nineteen years and thirteen percent had been in the present system over twenty years.

Question five asked about the total years of teaching experience. Twenty-seven percent had between five and ten years experience. Eight percent had between eleven and fifteen years experience, and thirty-four percent had over sixteen years teaching experience.

The sixth question asked about the highest degree of training you have completed. One person had no degree, and ninety-four percent had their baccalaureate degree. Four percent held a master's degree.

The seventh question asked about the number of hours in science training at the undergraduate level. Five percent had six or less hours. Forty-five percent had between seven and twelve hours and fifteen percent were between nineteen and twenty-four hours. Fifteen percent also had more than twenty-five hours at the undergraduate level.

Question eight pertained to the number of hours beyond the teachers' baccalaureate. Eighty-one percent had six or less hours. Eleven percent had between seven and twelve hours of graduate training.

Number nine was broken down into five components in teacher training that pertained to experience in planning and conducting in different areas of science teaching. The first criteria, demonstration, hit the one hundred percent mark. The second component, student investigations was seven percent. Seventy-three percent were trained in planning a field trip. Only five percent had any training in individual student progress. One hundred percent had training in planning or conducting experiments.

Question ten asked about teacher training of at least one course (two four-hours credit) in the following areas: Biological or Life Science, Earth Science, Physical Science, Mathematics, and Science Methods. All the responses to these questions were at or near one hundred percent.

The eleventh question, grade level you are presently teaching, found sixty-eight of the seventy responses were teaching at the intermediate level between the grades four and six.

Question twelve asked about the number of years taught at the present grade level. Forty-four percent had been at the present grade level between one and four years, twenty-three percent were between five and nine. Fourteen percent were between ten and fourteen, and ten percent had been at their present grade level over twenty years.

The thirteenth question asked about the type of classroom taught in the majority of the time. Seventy-one percent taught in self-contained classrooms, and twenty-nine percent were departmentalized.

The fourteenth question pertained to the enrollment of the attendance center in which you taught. Forty-seven percent were attendance centers with between one hundred and one students up to two hundred. Forty-two percent were between two and three hundred pupils, and eight percent were over three hundred students.

Table I

Personal Data Sheet
Results

1. Your present position in system:	
a. Superintendent	0
b. Elementary Principal	4
c. Elementary Teacher (K-6)	67
d. Other	1
2. Your age:	
a. 20-29	27
b. 30-39	16
c. 40-49	10
d. 50-59	14
e. 60 or more	4
3. Your sex:	
a. Male	18
b. Female	51
4. Your number of years in the present system (include the current teaching year):	
a. 0-4	23
b. 5-9	12
c. 10-14	18
d. 15-19	9
e. 20 or more	10

Table I Continued

5.	The total years of teaching experience you have had at the elementary (K-6) level, including the current teaching year:	
	a. 1-4	19
	b. 5-10	19
	c. 11-15	6
	d. 16 or more	24
6.	The highest degree of training you have completed:	
	a. No degree	1
	b. Baccalaureate	63
	c. Master's	3
	d. Ed.S.	0
	e. Ed.D. or Ph.D.	0
7.	Total number of hours in science training at undergraduate level:	
	a. 0-6	4
	b. 7-12	30
	c. 13-18	15
	d. 19-24	9
	e. 25 or more	9
8.	Total number of hours in science training at graduate level and/or after baccalaureate:	
	a. 0-6	56
	b. 7-12	8
	c. 13-18	3
	d. 19-24	2
	e. 25 or more	0
9.	Your preparation and training included experience in planning and/or conducting:	
	a. Demonstrations	68
	b. Student investigations	5
	c. Field trips	50
	d. Individual student progress	4
	e. Experiments	68
10.	Your teacher preparation included at least one course (2-4 hours credit) in the following areas:	
	a. Biological or Life Science	65
	b. Earth Science	60
	c. Physical Science	60
	d. Mathematics	65
	e. Science Methods	60

Table I Continued

11.	The grade level you are presently teaching:	
	a. Primary (K-3)	0
	b. Intermediate (4-6)	68
	c. Special (physical education, music, art, or other)	2
12.	The number of years you have taught your present grade level (including current year):	
	a. 1-4	30
	b. 5-9	16
	c. 10-14	10
	d. 15-19	4
	e. 20 or more	7
13.	The type of classroom in which you teach the majority of the time:	
	a. Self-contained	50
	b. Departmental	20
	c. Nongraded	0
	d. Other	0
14.	The enrollment of the attendance center in which you teach:	
	a. 101-200 pupils	33
	b. 201-300 pupils	30
	c. 301-400 pupils	2
	d. 401-500 pupils	4
	e. 501 or more pupils	0

Questionnaire

The questionnaire's general design was such that the seventy instructors supplied the vital data which was added to other factual data to become the basis for the tabulation on the evaluation check-list secured from the Iowa Department of Public Instruction (Appendix C).

Question one pertained to the school philosophy in science. The mode was thirty-three, this was forty-seven percent of the responses in general agreement with the school's philosophy in science. Four percent were in less than general agreement while seventeen percent were in total agreement.

Item two on the questionnaire dealt with goals of the science program. Thirty-five percent were in general agreement with these goals while thirty-four were between general and total agreement. Twenty-two percent were in total agreement and one percent in less than total agreement.

The third criterian considered was copyright date. The mode was thirty-one in general agreement. This was forty-four percent of the people answering the questionnaire. Twenty-one percent were between general and total agreement, while twenty-seven percent were in total agreement with their textbook copyright date.

The fourth question pertained to student evaluation criteria used in the science program. (Behavioral objectives, tests, etc.). Thirty percent were between total agreement and general agreement. Thirty-two percent were in general agreement. Eight percent were between general and total agreement and twenty-five percent were in total agreement.

The next question was the availability of required material and replacement materials. Twelve percent were in less than general agreement with the availability and replacement of materials. Twenty-one percent were in general agreement. Thirty-seven percent were between general and total agreement, and twenty-four percent were in total agreement.

Item six was natural resources and environmental awareness concepts. Seventeen percent were less than in general agreement. Twenty-one percent were in general agreement. Thirty percent were between total and general agreement, and thirty percent were in total agreement.

The next question pertained to math facts and how they were incorporated into the science program. Twenty-one percent were in less than general agreement with their present program. The mode was thirty-two, this represented forty-five percent who were in general agreement. Twenty-one percent were between general agreement and total agreement.

Health concepts and their relationship with science programs were considered in the next question. Twenty-seven percent were in less than general agreement. Twenty-eight percent were in general agreement, and twenty-eight percent were between general and total agreement. Fourteen percent were in total agreement with their programs.

Title nine consistency was the next question asked. Twenty-six was the mode. This also represented thirty-seven percent of the responses in less than general agreement with the question. Twenty-four percent were in general agreement, and eighteen percent were in total agreement.

Question twelve dealt with the teachers edition (scope and sequence, alternative teaching strategies, etc.). The mode was twenty-six, this represented thirty-seven percent being in total agreement with this question. Seventeen percent were between general and total agreement. Twelve percent were in less than general agreement.

The next question was the consistency of the program with the multicultural nonsexist education requirement. The mode was thirty-five. This represented fifty percent of the people answering the instrument, and being in total agreement with their program in

this area. Seventeen percent were in less than general agreement and thirty-two were in general agreement with the program.

Question thirteen dealt with required inservice for science programs. The mode being thirty-eight, represented fifty-four percent of the responses in less than general agreement with the program offered. Twenty-two percent were in general agreement. Only ten percent of the people were in total agreement with the inservice being required.

The next question dealt with the physical plant, facilities limitations, etc. Thirty-eight percent were in general agreement with what the school offered as a physical plant. Twenty-seven percent were in less than general agreement. Eleven percent were in total agreement.

The fifteenth question pertained to supportive materials available (audio-visuals, lab manuals, software, etc.). Fifty-five percent of the people were in less than general agreement. Twenty-four percent were in general agreement, and eight percent were in total agreement.

The next question was the appropriateness of the materials offered to the intellectual level of the students. The mode was twenty-nine, this represented forty-one percent of the responses. Twenty percent were between general and total agreement while twenty-seven percent were in general agreement, and twelve percent in less than general agreement.

Is the program offered sequential and articulated? Forty-one percent were in total agreement with their programs and twenty-four percent were between general and total agreement. Twenty-

eight percent were in general agreement, and twelve percent were in less than general agreement.

Career references in the science curriculum: The mode was twenty-one. This represented thirty percent of the responses in total agreement and twenty-five percent were between total and general agreement. Twenty-one percent were in general agreement and seventeen were in less than general agreement.

Question nineteen was level of teacher commitment required. Thirty-one percent were in total agreement with their programs. The mode was twenty-four, this was thirty-four percent of the people between total and general agreement.

The final question deals with integration with other science programs. Thirty-two percent were in total agreement, and thirty-one percent were between general and total agreement. Twenty-seven percent were in general agreement and less than ten percent were below general agreement.

Checklist

A composite of the data received from the questionnaire was tabulated on a checklist secured from the Iowa Department of Public Instruction. The instrument used was to compare your local science curriculum needs to available programs offered.

Evaluation Profile

A chart of the twenty assessed areas was constructed. This chart provides a profile of the assessment. The evaluation profile depicts the findings in each of the twenty assessed areas as they

apply to the elementary science program of instruction in grades four, five, and six of the schools located in Area VI. (See Table II)

Table II
Evaluation Profile

Key: 4 Total Agreement
2 General Agreement
0 Total Disagreement

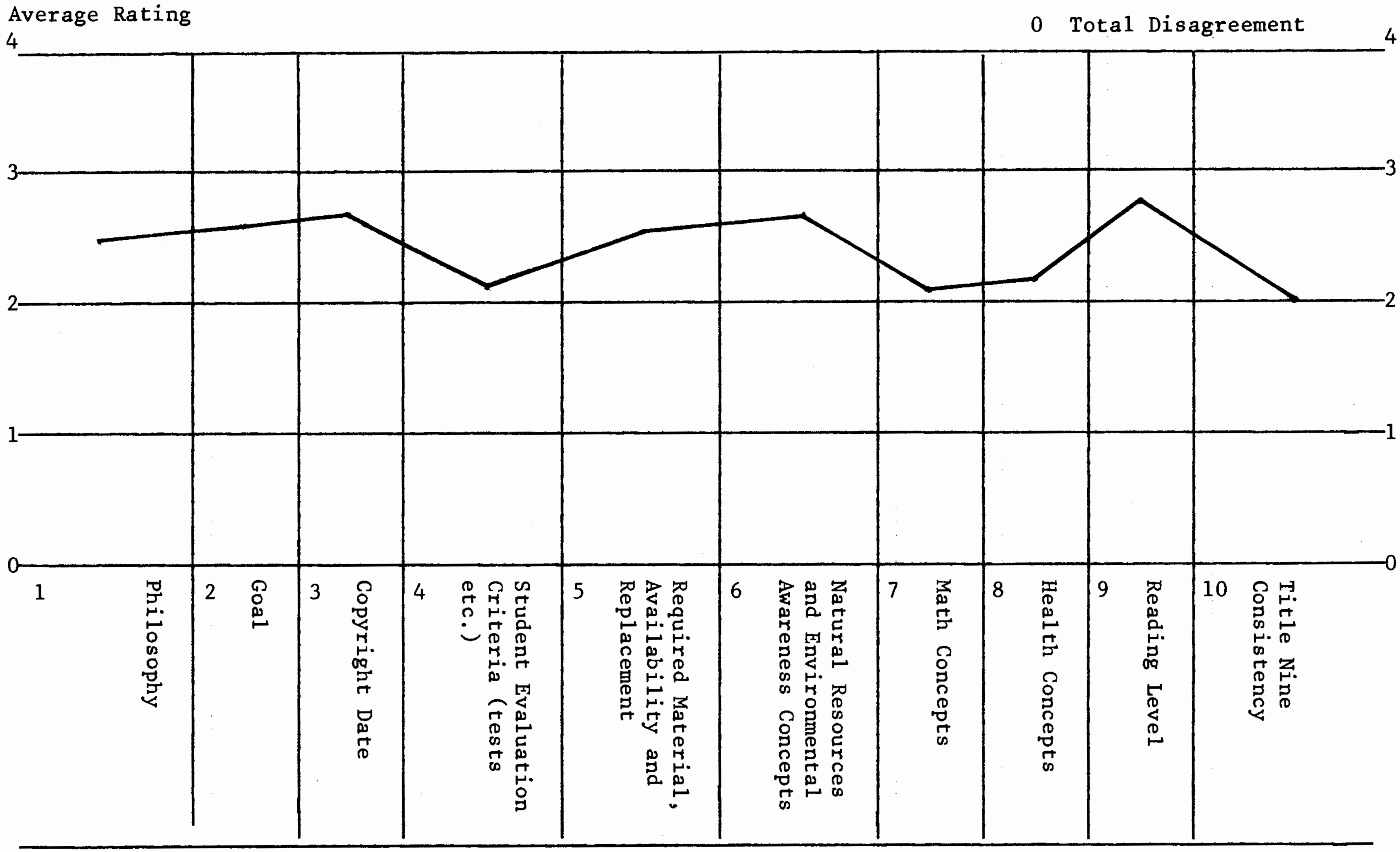
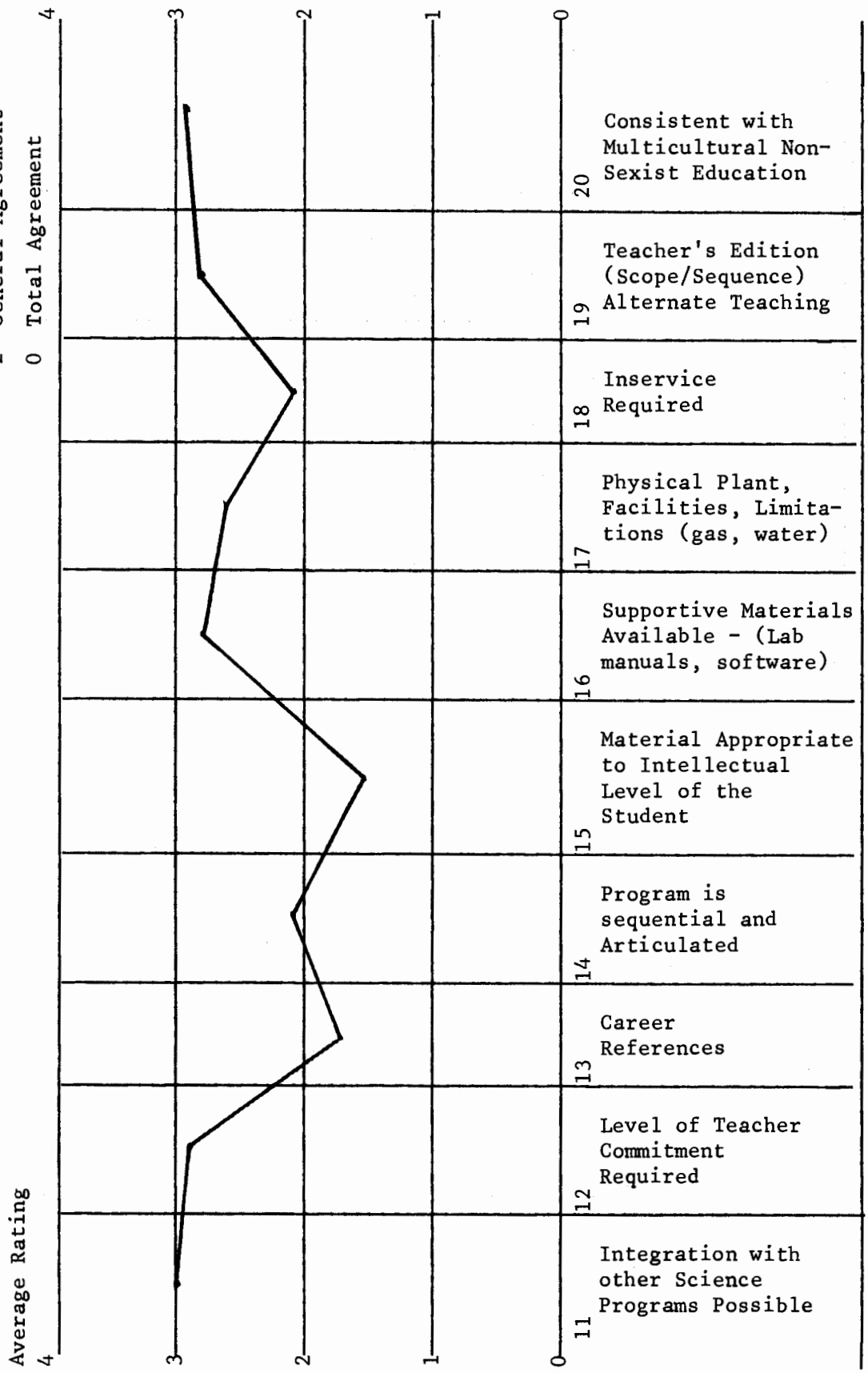


Table II Continued
Evaluation Profile



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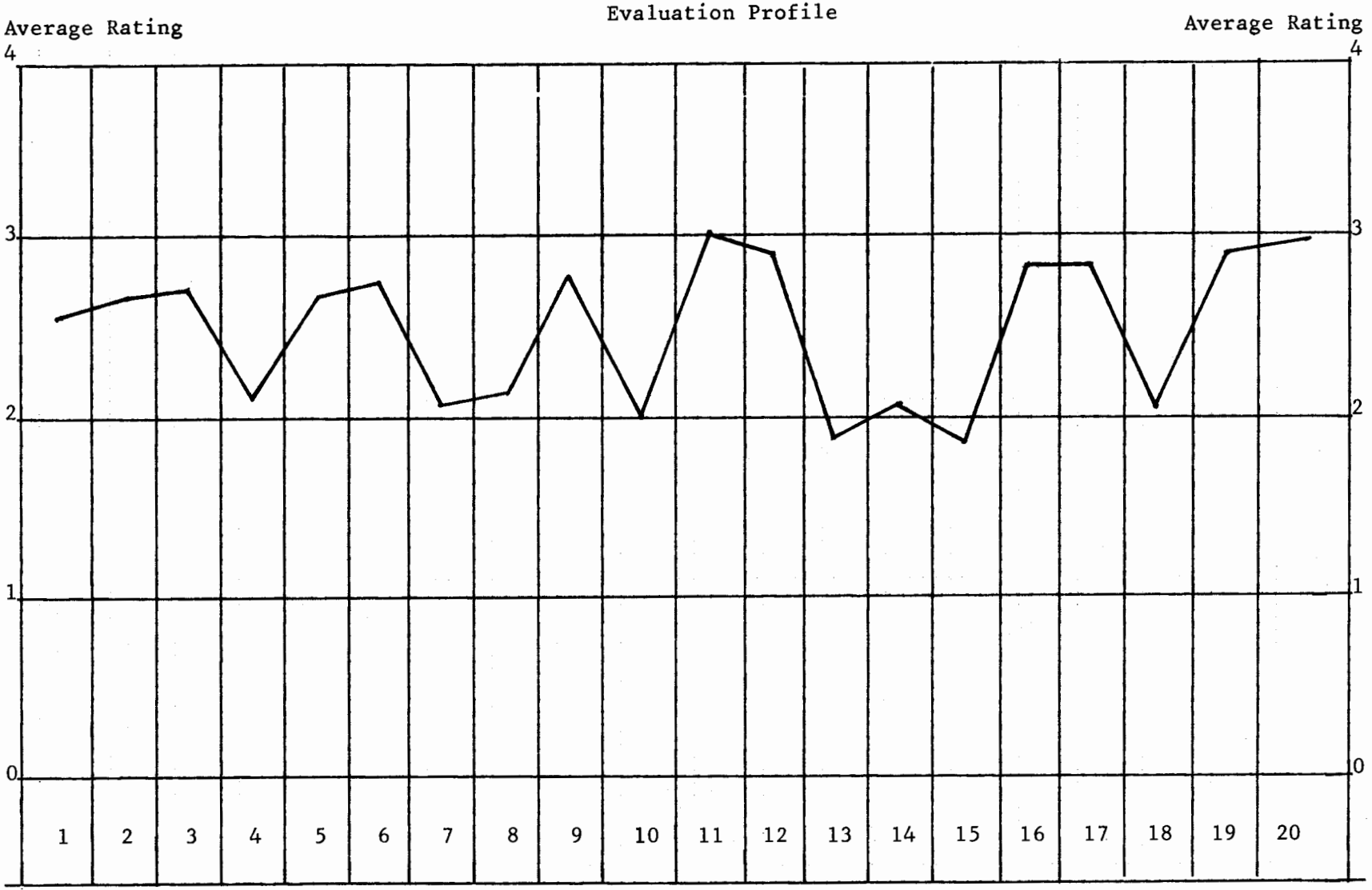

Chapter 4

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

It was the purpose of this study to conduct an assessment of the program of elementary science in order to evaluate the existing curriculum and related practices. An assessment checklist determined the extent of evidence that the practice existed.

A profile chart resulting from the checklist responses, and information from the personal data sheet pointed out the most pressing and crucial science-program problem areas. These priority problems can then become the starting point for improvements in the science programs.

Conclusions

An examination of the evaluation profile chart, and the personal data sheet, indicates the priority of problems that existed during the 1979-1980 year, in the Area VI Community Schools to be:

1. Youth activities that are directly related to science at the elementary level have received very little attention.

2. Increased attention must be given to evaluation and re-evaluation in order that teachers may know priority problems.

3. Evidence indicates it necessary to extend the curriculum beyond the confines of any one textbook.

4. Increased efforts need to be made to provide work areas to science talented students for independent research and projects outside the regular class time.

5. Revisions regarding the balance among earth, life, and physical science areas should be considered at each grade level. Attention should be given to scope and sequence of all units when assigned to the grade.

6. Few teachers have had any training or preparation for providing for students individual needs and existing inadequacies may be corrected by encouraging them to participate in the in-service seminars held regularly throughout the year.

7. It has been several years since some teachers have had any training in the science area. Attention should be given in this area encouraging them to attend in-service, and also participate in workshops during the summer. Few teachers have more than seven to twelve college hours in science, and then have not returned to school in this area for some time. In the elementary area, very few have any graduate hours in science.

The findings would indicate that most programs have a need for revision of some kind in each particular program. Most cases were only isolated weaknesses that were identified, and needed to be corrected. Any revision must be oriented toward better providing for the individual students' need. Instructors need to give special attention to value gained from the science related field trips, interviews, and experimentation as a vital part of curriculum.

Recommendations

If the assumption is made that conscientious teachers want to know how well they do, and how well the local science programs being offered fit their local science curriculum needs, then consideration of the following recommendations is suggested in order that they might identify the strengths and weaknesses of their programs of instruction.

1. Teachers and administrators should develop a local written philosophy of science specific to local needs. The comprehensive nature of science and its essential purpose in developing scientific literacy in all students should be a major feature of the statement.

2. The level of revision of the program should be decided. If major weaknesses and duplications are identified in the program, the teachers and administrators should recommend a major revision. If only isolated weaknesses are identified then supplements should be looked for, for these areas only. Individual teachers should be encouraged to improve areas of weakness specific to their grade level or course.

3. Assess physical facilities and recommend changes. A thorough assessment of the physical plant and facilities should be conducted, as these may limit the types of programs being offered.

4. Match curriculum needs with available curriculum materials. A comparison of local science curriculum needs with those of available programs should be conducted. At this time it is suggested they seek the expertise of the local Area Education Agency,

Department of Public Instruction, college/university consultants and media services may be of assistance.

5. If major changes are to be made, many possible programs should be presented to the science staff. These programs should possibly parallel the goals, and objectives developed by the local staff. Again you may have to call on the people suggested in recommendation four. Commercial sales representatives may provide some assistance.

6. Released time should be provided periodically in order that those persons involved in programs of instruction can be the persons who make reassessments in order to evaluate the program of instruction. Their findings can then become the criteria for establishing further recommendations.

7. The instructors responsible for the implementation of the new program should be encouraged to visit a school, of similar size, that is currently utilizing the science materials being considered for adoption. These same teachers should pilot the science materials, proposed for adoption, in one or two classes prior to district adoption.

8. In-service should be provided for teachers. This in-service should be meaningful and well arranged so as to encourage the effective use of the selected program. These should also be used to help instructors become better informed about current trends in curriculum development.

9. In order to assess improvement, the new program should be evaluated one year after revision. The students should also be evaluated. The teachers and administration should arrange for

regular, appropriate local and state or national, assessment of student achievement.

There should also be periodic curriculum review throughout the year to discuss pros and cons of the new program.

10. Teachers should be encouraged to test the value of field trips, small group investigations of community resources, and interviews when redesigning programs of instruction.

11. Teachers and administrators should consider providing the elementary science student some out-of-school science related activity. This could be a summer program of short duration or some leisure time activity sponsored by outside community agency and supported by the school.

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APPENDIXES

7. Total number of hours in science training at undergraduate level:

   a. 0-6
   b. 7-12
   c. 13-18
   d. 10-24
   e. 25 or more

8. Total number of hours in science training at graduate level and/or after baccalaureate:

   a. 0-6
   b. 7-12
   c. 13-18
   d. 10-24
   e. 25 or more

9. Your preparation and training included experiences in planning and/or conducting:

   a. Demonstrations
   b. Student investigations
   c. Field trips
   d. Individual student Progress
   e. Experiments

10. Your teacher preparation included at least one course (2-4 hours credit) in the following areas:

   a. Biological or Life Science
   b. Earth Science
   c. Physical Science
   d. Mathematics
   e. Science Methods

11. The grade level you are presenting teaching:

   a. Primary (K-3).
   b. Intermediate (4-6)
   c. Special (Physical Education, Music, Art, or other)

12. The number of years you have taught your present grade level (including current year):

   a. 1-4
   b. 5-9
   c. 10-14
   d. 15-19
   e. 20 or more

13. The type of classroom in which you teach the majority of the time:

   a. Self-contained
   b. Departmental
   c. Nongraded
   d. Other

14. The enrollment of the attendance center in which you teach:

    a. 101-200 pupils
    b. 201-300 pupils
    c. 301-400 pupils
    d. 401-500 pupils
    e. 501 or more pupils

If you wish a copy of the results of this study, please complete.

Name _____

Address _____

_____

APPENDIX B

Grade Level (s), Subject

MATCHING LOCAL SCIENCE CURRICULUM NEEDS TO AVAILABLE SCIENCE PROGRAMS

Use the following instrument to compare your local science curriculum needs to available programs being offered. Enter the name of the program being used on the horizontal line at the top of the instrument. Using the Likert Scale below and the criteria on the vertical axis, rate your present program by entering the appropriate number in each box.

0	1	2	3	4
Total Disagreement		General Agreement		Total Agreement

5
No Knowledge

Title of Program presently being used

Assessment Criteria

Philosophy

Goal

OTHER FACTORS TO CONSIDER

Copyright Date

Student Evaluation Criteria
(Behavioral objectives, tests, etc.)

Required Material Availability/
Replacement

Natural Resources and
Environmental Awareness
Concepts

Math Concepts

Health Concepts

Reading Level

Title IX Consistency

Consistent with Multicultural,
Nonsexist education requirement
(Code of Iowa) 257.25 (11)
670-3.5(257)

Cosmetic Appearance

Teacher's Edition
(Scope/sequence, alternative
teaching strategies, etc.)

Inservice Required

Physical Plant, Facilities
Limitations (gas, water,
electricity, hardware, etc.)

Supportive Materials Available
(audiovisuals, lab manuals, software)

Material appropriate to intellectual
levels of Students

Program is Sequential and Articulated

Career References

Level of Teacher Commitment
Required

Integration with Other
Science Programs Possible

POINT TOTALS

APPENDIX C

Grade Level (s), Subject

MATCHING LOCAL SCIENCE CURRICULUM NEEDS TO AVAILABLE SCIENCE PROGRAMS

Use the following instrument to compare your local science curriculum needs to available programs being offered. Enter the name of the program being used on the horizontal line at the top of the instrument. Using the Likert Scale below and the criteria on the vertical axis, rate your present program by entering the appropriate number in each box.

0	1	2	3	4
Total Disagreement		General Agreement		Total Agreement

5
No Knowledge

Title of Program presently being used

Assessment Criteria	1	2	3	4	5
Philosophy	3	33	22	12	0
Goal	1	25	24	16	0
OTHER FACTORS TO CONSIDER					
Copyright Date	6	31	15	19	0
Student Evaluation Criteria (Behavioral objectives, tests, etc.)	21	23	6	18	0
Required Material Availability/ Replacement	9	15	26	17	0

	1	2	3	4	5
Natural Resources and Environmental Awareness Concepts	12	15	21	21	0
Math Concepts	15	32	15	7	0
Health Concepts	19	20	20	10	0
Reading Level	6	24	22	18	0
Title IX Consistency	26	17	11	13	0
Consistent with Multicultural, Nonsexist education requirement (Code of Iowa) 257.25(11) 670-3.5(257)	12	11	12	35	0
Cosmetic Appearance					
Teacher's Edition (Scope/sequence, alternative teaching strategies, etc.)	9	12	21	26	0
Inservice Required	38	16	9	7	0
Physical Plant, Facilities Limitations (gas, water, electricity, hardward, etc.)	19	27	15	8	0
Supportive Materials Available (audiovisuals, lab manuals, software)	39	17	6	6	0
Material appropriate to intellectual levels of Students	9	19	14	29	0
Program is Sequential and Articulated	9	20	17	22	0

	1	2	3	4	5
Career References	12	15	18	21	0
Level of Teacher Commitment Required	8	15	24	22	0
Integration with Other Science Programs Possible	6	19	22	23	0

POINTS TOTALS

APPENDIX D

COVER LETTER

October 2, 1980

Dear

I am currently in the process of assessing the elementary science program in grades 4, 5, and 6 in all the Area Six schools. The instrument I am using was developed by the Iowa Department of Public Instruction and a committee of the Iowa Council of Science Supervisors. This instrument is designed for any and all elementary science programs.

I need your assistance with this project, and I hope it does not inconvenience you. I ask that you give the forms to your science teachers in grades 4, 5, and 6, collect them, and send them back to me by Area Six van.

All information by your school will be held in strict confidence. This is an anonymous instrument and I assure you all information will remain as such.

I would ask that you get the information back to me as soon as possible. Your help on this project is greatly appreciated. If you would be interested in the end results, I would gladly share them with you.

Sincerely yours,

Paul Eckerman
BCL Administrative
Assistant