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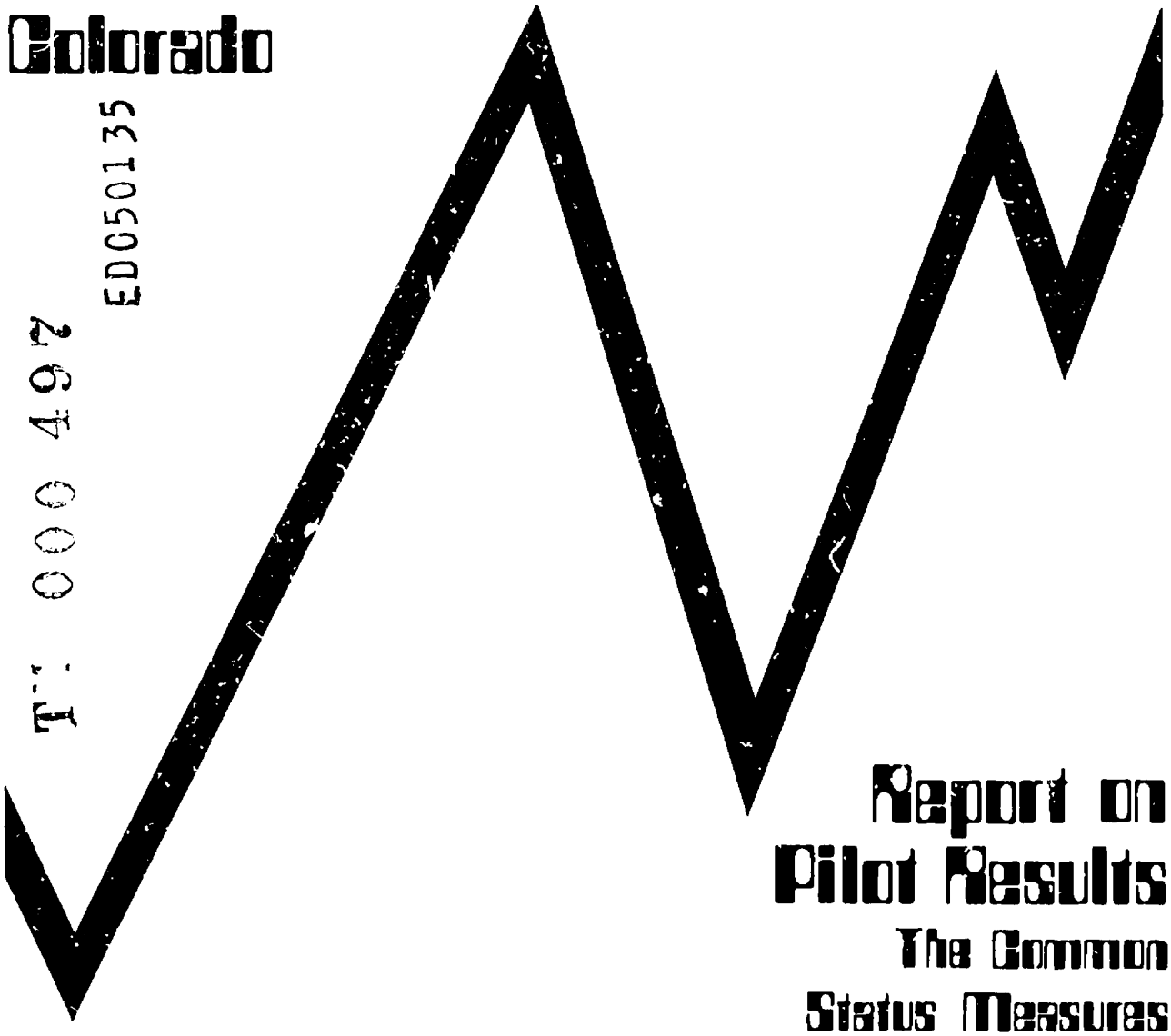
ABSTRACT

The procedures and results of a pilot program in a statewide assessment of learning in Colorado are presented. Findings and conclusions of the project in which the Common Status Measures of the U.S. Office of Education were administered to 12,000 pupils in 37 school districts concurrently with objectives-referenced items developed by the Colorado Department of Education are reported. Educational needs were concluded to exist in Colorado on the basis of assessment results. Objectives related to general goals, developing test items, sampling items and students by multi-matrix techniques, and analysis of resultant data are fully described. Substantive findings indicate the degree to which certain curricular objectives are being achieved in Colorado schools. Appendices present the rationale and procedures of assessment along with some 300 objectives stated in six common curricular areas: health, language, arts, mathematics, music, physical education, and science. More extensive reports of the results may be found in a set of "Working Papers" developed at each grade level in the various curricular areas. (Author/PR)

Assessing Educational Outcomes in Colorado



Report on Pilot Results

The Common Status Measures Objectives-Referenced Items

Colorado Department of Education
Byron W. Hansford, Commissioner

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COLORADO DEPARTMENT OF EDUCATION
Denver, Colorado

ASSESSING EDUCATIONAL OUTCOMES IN COLORADO

COLORADO EVALUATION PROJECT

- A PILOT PROGRAM -

May 1970

Prepared by

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December 1970
REPORT NUMBER TWO

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Successful completion of the Colorado Evaluation Project was possible only with the cooperation of others with the Colorado Department of Education and Pacific Educational Evaluation Systems. Curriculum consultants from several disciplines wrote objectives which were judged for importance by Colorado teachers. Dr. Gene Glass of the Laboratory of Educational Research at the University of Colorado consulted with fellows at the Laboratory and with others retained to write test items.

Personnel from the United States Office of Education arranged for the Common Status Measures to be administered concurrently with the test items developed in Colorado. The Common Status Measures were developed for the United States Office of Education under the direction of Dr. Robert Heath, Director of Pacific Educational Evaluation Systems. The Belmont Group provided further support in this joint effort.

Most importantly, the educators and school children of Colorado gave the effort and time required to make the project worthwhile.

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FOREWORD

The Colorado Evaluation Project had its genesis in the work of the Task Force on Assessment and Evaluation of the Colorado Department of Education. Early work produced statements of measurable objectives in six common curriculum areas: health, language arts, mathematics, music, physical education, and science. Later, Colorado volunteered to field test the Common Status Measures of Basic Verbal Status and Occupational Cognizance developed by Pacific Educational Evaluation Systems for the United States Office of Education.

Statewide testing took place in May 1970. Some 12,000 pupils in 31 school districts participated. Procedures and findings are described in detail in these documents:

1. Minutes of the Colorado Department of Education Task Force on Assessment and Evaluation;

2. Progress Report (June 15, 1970) 40 pages;

3. Technical Report (August 15, 1970) 225 pages;

4. Video-tapes on assessment of occupational cognizance and language arts (September 1, 1970);

5. Reports to the Colorado Legislature and the United States Office of Education (September 9, 1970);

6. "Working Papers" (October 20, 1970) 110 pages.

This report presents an account of the Colorado Evaluation Project - the procedures used and the results obtained. Procedural aspects of test development and sampling are described in the appendices. Typical results of the assessment are presented in the body of the report, illustrated by test questions and students' responses thereto.

More extensive reports of pilot results may be found in a set of "Working Papers" developed at each grade level in the various curricular areas assessed by the Project. Hopefully, these materials will be used in the work of improving educational opportunities for children and youth in Colorado.

Arthur R. Olson

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)

LIST OF TABLES

PART I
INTRODUCTION

Most Colorado 3rd graders can select the correct homonym to complete these sentences:

1. Mother bought some _____ for dinner.
   a) meet b) meat

2. The number three comes before _____.
   a) four b) for

These items were comparatively easy for Colorado students in the 3rd grade who participated in the pilot phase of the Colorado Evaluation Project in May, 1970. Some 90% of the responses to the first item were correct and 98% of the responses to the second item were correct. More difficult for Colorado 3rd graders was identifying antonyms (correct responses = 67%) and synonyms (correct responses = 20%).

Objective-referenced Assessment

Test items were designed to assess achievement of objectives judged to be important by Colorado teachers. Areas assessed were health, language arts, mathematics, music, physical education, and science. An explanation of the objective-referenced assessment follows, in brief:

Objective for 3rd Grade Math: Pupils display knowledge of money by identifying change in coins for purchases in amounts up to $5.00.

This objective was judged by 98% of a sample of Colorado teachers as "important" for a student to have mastered upon completion of the third grade. Certainly, the importance and utility of this objective is obvious; the objective specifies a capability that the child will most likely need and use all his life: making change. However, evidence that this objective is not being achieved was found in third grade students' responses to two items assessing the capabilities to make change for a $5.00 bill, or less.

Example Items

Bill had two dollars. He bought a sailboat for $1.35. His change was:

a) three quarters
% correct = 28 X b) two quarters and three nickels
c) one quarter and two dimes
d) three quarters, one nickel, and one dime

Sally bought a book for $3.80. She paid the storeKeeper with a five dollar bill. Her change was:

a) four quarters
% correct = 50 b) two quarters, three dimes, and two nickels
c) seven dimes and three nickels
X d) one dollar and two dimes

These math items were difficult for Colorado children in the 3rd grade. The first item received a total of 28% correct responses. The second item received a total of 50% correct responses. These responses are not much better than chance; if the students chose their answers blindly, one could expect that about 25% of the pupils would guess the correct one of the four possible response. There appears to be a need for students to learn to make change in the 3rd grade!

The Common Status Measures (CSM)

Concurrently with these objective-referenced items, the Common Status Measures were administered to a sample of Colorado students. Developed by Pacific Educational Evaluation Systems for the United States Office of Education, these items provided evidence of educational needs in the areas of occupational cognizance and basic literacy.

Evidence from Assessment

Students' responses to the items mentioned above give evidence of "educational need," defined as "the discrepancy between an objective and its achievement." The responses are not conclusive proof of a need; there is always a margin of error in estimating from a sample. Also, some items may have failed to assess accurately the students' capabilities which the ob-

jective specified. However, students' responses. such as those to the math items above, constitute evidence that some objectives judged to be important by Colorado teachers are not being achieved by Colorado students.

Evidence. The statewide assessment produced evidence of student achievements as well as student needs. One objective, specifying students' capabilities in language arts, states as follows:

> The pupil will apply his ability to use parts of a book as measured by an exercise directing the child to locate and use the following: (a) title page (b) table of contents, (c) glossary, and (d) illustration list.

Items assessing these capabilities were as follows:

Example Items

(This simulated "Table of Contents" was given in a 3rd grade language arts test booklet)

TABLE OF CONTENTS

Chapter		Page
1.	Packing.....	4
2.	A Picnic.....	9
3.	Seeing the Animals.....	12
4.	Milking the Cows.....	15
5.	Walking in the Fields.....	19

1. On which page does "Seeing the Animals" start?

Correct responses = 81%

a. 2
b. 4
X c. 12
d. 13

2. "A Picnic" is on pages

Correct responses = 46%

a. 4 through 11
X b. 9 through 11
c. 4 through 12
d. 9 through 12

3. Page 16 will tell us something about

Correct responses = 63%

X a. cows
b. corn
c. a picnic
d. walking

These items assess students' capabilities in language arts. Other items assess verbal status. Such educational outcomes are envisioned in a common goal for education in Colorado, stated in 1962 in the document Goals For Education in Colorado by the Colorado Department of Education and approved by the Colorado State Board of Education:

> Goal: Command of Knowledge, Skills, and Habits and Attitudes for Effective Learning Throughout Life.

This report contains evidence of progress toward goals in Colorado. The evidence is found in the results of the Pilot Assessment Project which in May, 1970, tested a sample of 12,000 students in 31 districts across Colorado in Kindergarten, Grades 3, 4, 6, 9, 11, and 12. More extensive reports of testing results may be found in sets of "Working Papers" prepared in the curriculum areas assessed: health, language arts, mathematics, music, and physical education.

Procedure. Multi-matrix sampling, described in Appendix A, was used in assessing educational outcomes statewide. Randomization in (1) construction of test forms, and (2) the selection of pupils provides samples from which information may be gained at a useful level of reliability; the samples so selected are representative, generally speaking, of all students in Colorado taking all items of their appropriate grade level.

Procedures developed by the Colorado Evaluation Project have several innovative aspects:

(1) Judgements of teachers as to importance of the objectives gained involvement of those close to on-going teaching-learning situations.

(2) Multi-matrix sampling, by which only a few pupils each try a few items, minimized disruption of on going school activities, while producing information on pupil populations.

(3) By specifying capabilities of pupils, the objectives emphasized the basic purpose of the schools: pupil learning.

(4) Computer analysis provided information in useable form in a minute fraction of the time required by hand correction of tests and tabulation of scores.

Organization and Use of This Report

Organization. Five main sections comprise this report: Part I introduces the assessment project; Part II contains results from objective-referenced items in relation to broad goals for education in Colorado; Part III contains results from the Common Status Measures of verbal status and occupational cognizance; and, Part IV sets forth conclusions and further plans regarding assessment of educational outcomes in Colorado. Finally, several appendices explain rationale and procedures developed in the Colorado Evaluation Project. Numerous examples from the assessment data will illustrate evidence of educational achievements and needs.

Use. Increasingly, educators are being called upon to give evidence that children are, in fact, learning at school. Presentations to school boards, study committees, and courts of law have included evidence of student achievement and student need. Such evidence may be used for determining, (1) whether present efforts are producing desired results in terms of student learning, (2) where to allocate resources to turn weaknesses into strengths, and (3) whether Colorado students are in fact receiving quality education as set forth in Goals For Education In Colorado.

Further steps are planned to make full use of the assessment results which are potentially a gold mine of information regarding progress toward goals. Five steps are so planned.

1. A set of "working papers" has been prepared for each grade level and/or content area. Included are, (a) indications of student performance on each item for various objectives; (b) critical comments on items and objectives; (c) instructions as to interpretation of results; and (d) summary of educational achievement and needs as stated in this report.

2. A work group of department personnel will scrutinize these "working papers" to: (a) refine objectives and items for content validity; (b) state explicitly further educational needs as indicated by the data (See Appendix E of this report); (c) recommend possible remedies for needs so identified.

3. Departmental sessions, including Planning and Evaluation Unit members with representative groups, lay and professional, will determine priorities on objectives and standards of acceptable performance on items.

4. Priorities for items and objectives will be determined by Assessment and Planning personnel to be included for re-assessment in a spring assessment program.

5. Concurrently with above activities will be try-out of refined items from this first assessment along with items designed especially for second assessment project.

In these steps and related activities, the Assessment and Evaluation Unit of the Colorado Department of Education hopes to contribute to the improvement of educational opportunities in Colorado.

PART II

RESPONSES TO OBJECTIVE-REFERENCED ITEMS

Student capabilities were assessed in relation to objectives stated in common curriculum areas of health, language arts, math, music, physical education and science. The capabilities were assessed by test items which provided opportunities to demonstrate achievement of objectives.

Curricular objectives may serve much as a basket in basketball or a goal line in football; i.e., progress may be determined in relation to a common goal or objective. By assessing progress toward common goals and objectives, the Colorado Evaluation Project produced evidence of achievement and needs in relation to those goals and objectives. Rationale of objective-referenced assessment is presented in Appendix C of this report.

On the following pages of this part of the report, evidence of students' achievement and needs are reported according to commonly-accepted goals and objectives. Numerous examples from the tests are given along with performance levels of Colorado pupils on the various items.

Goal Number One

As authorized by the Colorado State Board of Education, Goal #1 of the 1962 Goals For Education In Colorado reads as follows:

> Command of the Knowledge, Skills, Habits, and Attitudes Essential for Effective Learning Throughout Life
>
> a. To read with understanding, enjoyment, and speed.
> b. To know and use sources of information.
> c. To write legibly, effectively, and without ambiguity.
> d. To speak correctly, clearly, and meaningfully.
> e. To listen and observe critically and with objectivity.
> f. To understand the purposes and methods of scientific thinking.
> g. To know the concepts and terms of science.
> h. To compute and communicate in quantitative terms.
> i. To use mathematical reasoning for solving problems.
> j. To function effectively in areas of social science, as indicated in the goal which follows.

To make this goal operational, performance objectives were stated in areas suggested by the goal: language arts, mathematics, and science. Evidence of achievement and needs in these areas is presented below, each area in turn.

Achievement and needs in language arts. Teachers of language arts, kindergarten through grade twelve, strive to foster verbal facility and skill among their students. They give stimulating lessons, using a myriad of media and procedures in helping students at all stages of development. Accordingly, 90% of teachers of language arts in Colorado ascribed importance to this objective for students upon completion of the 6th grade:

> The pupil applies skill in use of research tools and techniques as measured by his ability to select appropriate reference materials, to use index and other guides, to take notes, to outline, to summarize, etc.

Performance of students in the 6th grade indicates this objective is being achieved in part. Items assessing achievement of one aspect of the objective are as follows:

Use the following page from a newspaper index to answer the questions below it:

Example Items

IN TODAY'S POST

Ann Landers	46	Guideposts	76
Bridge	28	Movies	75
Classified	61-72	Obituaries	60
Comics	18	Police Blotter	60
Crossword	18	Society	50
Drama	73-75	Sports	77-83
Editorial	24	Sylvia Porter	38
Financial	35-41	Tax Tips	28
Fire Calls	60	TV, Radio	42
Hatlo	28	Women	43-53
Horoscope	45	World News	5-15

1. On what page would you look to see what new movies are playing in town?

(Correct responses = 90%)

a) 61
b) 73
X c) 75
d) 50

2. On what page would you look to see who was arrested by the police last night?

(Correct responses = 86%)

a) 5
b) 72
c) 76
X d) 60

3. On what page would you look to see if your favorite team won the game yesterday?

(Correct responses = 91%)

a) 61
b) 28
X c) 77
d) 60

4. In what section would you expect to find a story about a special movie on television tonight?

(Correct responses = 79%)

a) movies
X b) TV, Radio
c) Editorials
d) Sylvia Porter

Percentages of correct responses indicate that most 6th graders in Colorado can use the index of a newspaper. Further analysis of these response levels may lead to some reasons why the fourth item above was the most difficult for the students to get right.

An objective for 9th grade language arts, judged important by Colorado teachers, states as follows:

> Given printed materials to read silently, the pupil's comprehension is measured by his ability to (a) locate information, (b) identify major and minor ideas, (c) interpret facts and feelings, (d) remember sequenced events, (e) draw logical conclusions, (f) recognize author prejudices, and (g) identify the author's purpose.

One item assessing this objective gave the 9th grade student directions from an aspirin bottle to read, followed by questions as to what to do in various cases.

Item: Read the following material carefully and then answer each of the questions following the selection.

Example Items

The following directions appeared on the label of an aspirin bottle:

"Dosage. Adults. Two tablets with water. Repeat if necessary every four hours, or follow directions of your physician. Dosage should not exceed 8 tablets per day. For children (6-12) use half the adult dosage.
Warning. Keep this and all medicines out of children's reach. In case of accidental overdose, contact a physician immediately.
Caution. Do not use for more than 10 days unless directed by physician. Consult physician at once if sinus or arthritis pain persists (say for a week) or if skin redness is present, and especially in arthritic conditions affecting children under 12. For children under six, use only as directed by a physician. Consult dentist for toothaches immediately."

1. A mother decided to give her five-year-old child one tablet four times each day for a week. Did she obey the directions on the label?

a) yes
(Correct responses = 62%)X b) no

2. Which one of the following titles best describes the directions?

a) "A few May Not Be Enough."
(Correct responses = 85%) b) "Quick Relief Will Be Yours."
X c) "If in Doubt, See Your Doctor."

3. What is the greatest number of aspirin that a seven-year-old child should take in one day?

a) 2
(Correct responses = 84%)X b) 4
c) 8
d) 0

4. What is the main purpose of the paragraph that begins Caution?

a) to prevent a person from taking an overdose of aspirin.
(Correct responses = 34%)X b) to prevent a person from treating a serious ailment by himself instead of consulting a professional.
c) to prevent a person from getting sick.
d) to get a person to buy more aspirin.

The inability of the students to demonstrate adequate achievement on all of these questions has obvious implications. Three of four 9th grade students, some of them babysitters, no doubt, might sanction giving aspirins to children under six, even though the directions clearly indicate that this should not occur. One in five also failed to indicate the correct dosage limitations for children six years old or older.

On a variety of other reading items, Colorado 9th graders demonstrated a low to moderate ability to perform as specified by the objective. In particular, the students showed a low ability (7%) to identify an author's purpose; only 30% of the students were able to correctly recognize propaganda-laden phrases, while approximately 60% of the students displayed an ability to interpret facts and feelings as contained in various written selections.

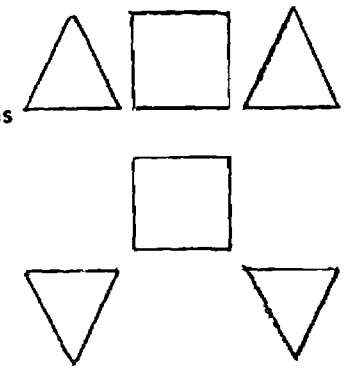
Achievement and needs in math. Teachers of mathematics strive for facility and understanding among their students in the language of quantity. Implementing newer material for conceptual development in math, the teachers strive for student understanding, often with intuitive and creative methods in the classroom. The mastery of one skill often opens doors of new challenge to a student in a math class.

Evidence was found that kindergartners can grasp mathematical concepts important for future development. Incipient skills of naming, ordering, identifying and analyzing were found by assessing capabilities specified in the following objective:

> Pupils will indicate the ability to analyze a set of at least two objects by ordering the objects A and B as (A<B, A>B, or A=B). They will also indicate the ability to comprehend cardinality of sets by naming the number contained in the set.

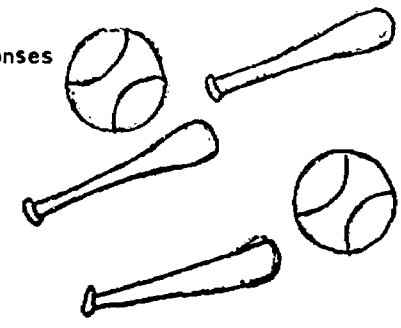
Example Items

Students were shown the following diagram and were asked questions about them



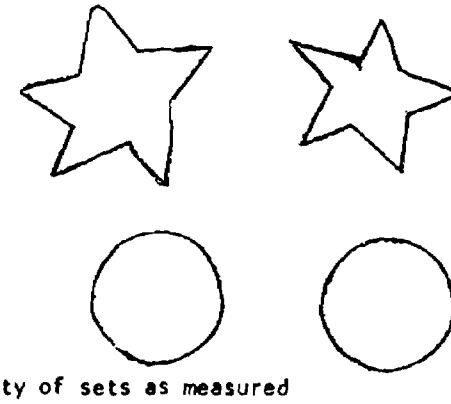
		Correct responses
a)	How many △ are there?	(80%)
b)	How many □ are there?	(96%)
c)	How many △ and □ in all?	(79%)
d)	Which has less?	(72%)

Students were shown a drawing of 2 balls and 3 baseball bats and were asked:



		Correct responses
a)	How many ⚾?	(96%)
b)	How many 🏏?	(84%)
c)	How many ⚾ and 🏏?	(56%)
d)	Which has more?	(92%)

Students were shown a drawing of stars and circles of similar size and were then asked:



		Correct responses
a)	How many ☆?	(92%)
b)	How many ○?	(100%)
c)	How many ☆ and ○?	(72%)
d)	Are the numbers of ☆ and ○ equal or unequal?	(48%)

Most children were able to comprehend cardinality of sets as measured by naming the number contained (a) and (b) of the above items. But they experienced difficulty when they had to determine the total number of items in two different sets, (c). This is especially evident in the other case,

above, of adding bats and balls. This may suggest that perhaps their ability in these areas may be dependent not only on the number of items in each set, but also the similarity between the items of the two sets.

Results on the pilot assessment gives evidence that 12th graders are in fact graduating with the basic computational skills deemed important by their teachers. One objective stated as follows:

> Pupils will indicate comprehension of the fundamental operations of algebra by demonstrating ability to solve computational problems with fractions and decimals.

Following are listed some of the items used to give an idea of the variety of problems 12th grade students were asked to solve:

	Correct Responses
2 1/7 + 1/2 = ?	91%
5.204 + 3.2 + .06 = ?	88%
4/9 - 2/3 = ?	80%
2 2/3 X 3/4 = ?	75%
48.3 - 8.324 = ?	73%
2 3/4 + 5 7/2 + 8 5/6 = ?	72%
.42 - .0007 = ?	60%

If these items are a fair measure of attainment of the stated objective, it appears that a large majority of the students possess comprehension of the fundamental operations needed to work with fractions and decimals. Ninth grade students were given several items comparable to these presented here and the results indicate that about 10% more of the 12th graders were able to solve such problems than the 9th graders. This objective is more nearly met than any of the others stated for this grade level.

Other expected capabilities in math, judged important by math teachers, were found lacking in the Colorado assessment pilot. Materials in new or

"modern math," designed to give the student broad numeric understanding, were not generally understood by a majority of Colorado students. For example this objective:

> Pupils will show ability in analysis by naming solution sets for systems of simultaneous equations.

was assessed by this item:

Example Item

Choose the solution set for the system of equations:

$$3x + 6y = 24$$
$$x - 2y = -6$$

Percent correct: = 40%

X a) (1,3 1/2)
b) (3 1/2,1)
c) (3, 4 1/2)
d) (4 1/2,3)

If this item truly represents the abilities of 12th grade students in this area, it appears that there are still a large number of students are not able to solve simultaneous equations. Perhaps more time needs to be spent in this area. Also, consideration needs to be given as to what performance would be adequate statewide. Is 100% mastery valuable on this objective regarding simultaneous equations?

Goal Number Ten

Creation and appreciation of beauty, natural and man-made, is envisioned as a goal of learning in Colorado. These capabilities were partially assessed according to this general goal:

> Adequate Opportunities for all Persons to Acquire Appreciation of Beauty, Wherever and However It May Be Manifested, and the Motivation to Create It.

Nature of the goal. This goal calls for capabilities often classified under the affective domain. Appropriate judgements, attitudes, and other capabilities are typically specified by objectives in the affective domain.

Artists generally agree that knowledge of structure, form and craftsmanship is basic to any fine or applied art; art has a factual dimension as well as an expressive dimension. Capabilities in the factual or informational aspect of music were assessed in a representative sample of Colorado public school students.

Achievement and need in music. Teachers of music in Colorado schools, in their various situations, strive to give their students a lasting appreciation and skill in music. Performance groups, music classes, individual coaching, special activities ---- all are means to this generally accepted goal. While performance skills are the most obvious results of the teachers' efforts, deeper insights into music are stimulated through attention to the underlying structure and basic skills in this area of human endeavor.

In grade 3, three main objectives were measured, with a variety of skills subsumed under each objective, all related in some way. The first objective measured was that of the elements of musical notation. (notes, scales, other musical abbreviations found in written music).

> Pupils should be able to comprehend standard musical notation and its written and verbal symbols.

Example Item

What is the letter name of the circled note?

(Correct responses = 19%)

X a) A
b) B
c) C
d) D

The curricular implication from this is clear: the most basic elements of musical notation are not yet learned in 3rd grade. Without them, the continuation of the student's musical education appears in jeopardy. Performance on other questions relating to notation were also at or near the zero level of correct response.

Another major objective deals with listening, discrimination, and other aural skills. It subsumes song recognition; remembering rhythmic patterns; and differentiating between melodies by timbre, composition, rhythm, meter instrument, pitch, volume, tempo, harmony, direction, and form by parts.

Relative high performance was noted in two areas: song recognition and pattern recognition.

Pupils will recognize particular works by sound recognition and to identify a few standard songs and pieces.

	Example Item
	You will hear part of a composition. What is the name of the composition?
(Correct responses = 64%)	a. Sleeping Beauty X b. Peter and the Wolf c. Billy the Kid d. Carnival of Animals

A different item dealing with recognition received 64% correct responses. In questions dealing with rhythmic patterns, 56% of the students detected which two of three patterns were the same. The curricular implication for these areas is that while response levels are better than for any other areas, some improvement is needed in teaching children standard songs and works.

A third major objective was related to music terminology, works, personalities in music, and musical instruments. Students appeared to know instruments and families of instruments quite well, as evidenced by 95% and 73% correct response rates on questions relating to them. Their knowledge of musical terms was poorer.

Pupils will comprehend common musical terms for phenomena relating methods of instrument vocal performance.

Example Item	
When one person sings or plays alone, we call it a:	
Correct responses = 59%)	a. duet X b. solo c. round d. coda

Performance on questions relating to composers and composition was little above what guessing would produce, indicating poor knowledge in this area of music. Curriculum implications for this major objective were that preparation in knowledge of instruments and how they are played is good, but for other areas, improvements are needed. Terminology is an important part of any good foundation in music, and advancement is hindered by an inadequate knowledge of working definitions in this area of human endeavor.

Goal Number Eleven

Health, physical and mental, is a valued outcome found in the goals statement of 1962 and is set forth in goal #11 as follows:

> Adequate Opportunities for all Persons to Acquire Knowledge, Attitudes, and Self-understanding Basic to the Achievement and Maintenance of Physical and Mental Health.

Objectives in both health and physical education reflected values of Colorado educators for effecting informed behavior among their students regarding health. Assessed were objectives for knowledge of health and safety practices and for knowledge of athletic form and rules.

Achievement and needs in health. Most schools do not have regular classes in health or hygiene. Students learn health practices in special programs, such as drug education, in activities related to science, social studies, and other regular classes, from parents, from the mass media, and from other common sources of information.

Assessment regarding health objectives, then, indicated some of the results of both formal and informal teaching-learning situations. This assessment project collected public health information heretofore uncollected in Colorado. Educators and public health officials have a common responsibility in providing health information for reasoned decision-making. To regular public health information of epidemiology and sources of morbidity, can now be added information regarding achievement and needs in health education in Colorado.

Colorado children and youth are generally aware that smoking will injure their health. At grade levels 6, 9, and 12, well over 90% of the students answered correctly to the following items:

Example Items

People who smoke cigarettes all their lives will be just as healthy as people who never smoke cigarettes. (Correct responses = 98%)

True_____ False __X__

Which one of the following puts the smoker in greatest danger of lung cancer?

(Correct responses = 96%)

X a. cigarettes
b. cigars
c. pipe tobacco
d. marijuana

Whether the knowledge is acquired through the media, through one's parents, peers, or school, it is quite clear that almost all children and youth are aware of smoking hazards. With this information, anti-smoking campaigns needn't increase their output of factual information; attitudes may need consideration.

Other items in the health area assessed achievement of objectives for safety, nutrition and diet, immunization, body growth, and related topics. Identical items given at several grades facilitated comparisons as to increments of information in evidence relating to age. An example follows:

Example Item

The best way to keep from getting a bad disease like polio, smallpox, German measles, mumps, or whooping cough is to:
(Correct responses = 43%, grade 6; 88%, grade 9)

a. keep yourself clean
b. stay away from strangers
X c. get shots (vaccinations) for them
d. eat only healthy foods

A critical need at the 6th grade appears to have been taken care of by the time the pupils have reached grade 9. The rate has more than doubled from inadequate to fairly adequate.

Low rates of response on some of the health items indicate specific educational needs. Low scores, traced to a certain geographical location or pupil population group, may focus the allocation of corrective resources.

There seems to be insufficient growth on this item:

Example Item

Most fat people are fat because:

a. they were born that way
X b. they eat more calories than they burn up in exercise
c. they eat wrong kinds of food

Grade	Correct responses
6	38%
9	76%
12	70%

This item reveals a marked increase in the rate of correct response from grade 6 to the later grades, but by no means would most experts regard a 3/4 correct response rate as adequate on such a common problem.

Other misconceptions held about health include, (1) immunization prevents tuberculosis, (2) mental illness is inherited, and (3) that strenuous exercise is bad for you.

On this last item, pupils from middle socio-economic groups had much lower percentages correct than did the lower or high status groups. Here is one item not following the usual pattern of low achievement relating to poverty. On the other hand, items assessing knowledge of diet and nutrition

did seem more difficult for pupil population groups of lower socio-economic status and of ethnic minorities. (See Part IV of this report for other such comparisons)

Achievement and needs in physical education. Coaches and gym teachers strive to teach skills and rules of athletic activities. Often the teacher, in instructing a youth, will give advice as to form. "Keep your arm straight and your eye on the ball" is a typical admonition of a coach or teacher.

The assessment provided evidence relating to objectives regarding form and rules of common physical activities. Examples follow.

Objective: The pupil will demonstrate his knowledge of games skills. (P. E., Grade 3)

Example Item

When trying to hit a pitched ball, your eyes should be looking at:

a. the pitcher
(Correct responses = 84%) b. the second baseman
X c. the ball
d. home plate

It is apparent from the above results that most students at this age are aware that they must keep their eyes on the ball in order to hit it. Since the concept of "watching the ball all of the way" is fundamental to many games, it may be worth re-emphasizing even though most students are already aware of it.

Example Item

When a ball is hit along the ground, you should catch it with your legs:

a. together
(Correct responses = 6%) b. apart
X c. one in front of the other
d. it doesn't matter how your legs are

The fact that none of these students knew the correct answer attests to the need for much additional emphasis on this skill. It is important not only as fundamental to smooth handling in catching and throwing the ball, but as

a precaution against serious physical injury. This method of catching allows a person to catch and throw in one smooth operation with minimal effort.

One item referred to the proper method for reaching up to catch a softball. Approximately 11% knew the correct answer. Again, this attests to the need for additional emphasis in teaching fundamental skills for catching and throwing. Knowledge of these skills is essential for proper development. Even though children at this grade cannot be expected to perform these skills efficiently, they must know the proper methods for executing the skills if they are to improve in other than a haphazard manner.

Objective 2. The child will know the rules of safety on the playground.

Example Item		
When climbing on the jungle gym, your hands should grip the bar so the thumb is:		
% correct = 57	X a.	on the opposite side of the fingers
	b.	on the same side of the bar as the fingers
	c.	either way is fine

Slightly more than half (57%) of the students knew the correct answer to this question. Although this question is a small sample from which to judge the application of playground rules of safety, it does suggest that the students need more guidance in the use of playground equipment. Teachers, assuming the children have the proper knowledge, or assuming that the required skills will be picked up as they explore the equipment often fail to point out that there is a right and a wrong way of playing with each piece of equipment. Consequently, many children are allowed to play with the availab. equipment without the requisite prior instruction.

Objective: The pupil will identify capacities and skills. The following question asks about a somersault, an activity which most third graders have attempted to master.

Example Item

When you do a forward roll (somersault) your body should be:

(Correct responses = 70%)

a. stretched out flat
X b. tight together in a ball
c. bent at the waist only
d. bent at the knees only

Objective: Pupils will demonstrate knowledge of life sports. The questions under this objective have been broken into four groups, each including several sports. This was done so that the results which pertain to one certain area could be discussed without implying that other sports could be expected to follow the same pattern. (Football, basketball, baseball, and track and field; grades 9 and 12)

Example Items

A player is out-of-bounds in basketball when: (Correct responses = 9th grade = 86%; 12th grade = 91%)

X a. he has one foot on the out-of-bounds line
b. he is within the free-throw lane
c. he has one foot near the out-of-bounds line
d. he reaches over the line to hook the ball back into the court

Two ways the defense might score in football are: (Correct responses = 9th grade = 23%; 12th grade = 38%)

X a. safety and a punt return
b. run and field goal
c. intercepted pass and kickoff return
d. fumble and a forward pass

The two sports here included are high school athletic activities. As such, most students participate in them under true game conditions and rules only as spectators, a situation much like the general public's involvement in these sports activities. Basketball is probably an exception here because the game lends itself to full participation by both sexes in most P. E. classes. That may at least partially account for the high percentage of persons correctly answering the questions pertaining to basketball, while only a rather low percentage knew the correct answers in the other sport areas. Response to the three questions above appeared typical of most responses given to test items covering these four areas. The test questions

indicate that students know most about game rules, second most about game terminology, and least about game strategies. Almost all students were aware of what constituted being out-of-bounds in basketball.

PART III

THE COMMON STATUS MEASURES: AN ANCHOR

Concurrently with the objective-referenced items discussed above, the Colorado Evaluation Project administered the Common Status Measures, which were authorized by the United States Office of Education in conjunction with representatives of the National Council of Chief State School Officers. The original purpose of the Common Status Measures was to serve as one component of a comprehensive system for evaluating federally-funded projects in elementary and secondary education.

The Colorado Evaluation Project used the Common Status Measures as an anchor; by comparing Colorado results with previous results, stability of the Common Status items could be determined. Previous work with the Common Status Measures also provided valuable reference points in planning and carrying forth the Colorado Evaluation Project.

Dr. Robert W. Heath, director of Pacific Educational Evaluation Systems, directed the development of the Common Status Measures (CSM). He describes uses of the CSM as diagnostic instruments as follows:

> The Common Status Measures are a little like the physician's X-rays. They can point out anomalies, failures, triumphs and normalcy. They do not substitute for the professional skill and judgment of the practitioner. To be used effectively, the CSM must be interpreted by educators close enough to the schools to know what implications the results have in the context of the educational system.

The Common Status items which were administered in Colorado, with minor revision, were the same items administered to a national sample in 1969. States participating in the national sample were: Pennsylvania, Texas, Florida, Colorado, Washington, and Wisconsin. Results from the national study are reported in the Final Report: Comprehensive Evaluation Project of the United States Office of Education, December, 1969.

Comparison of Colorado with national scores on the CSM gives indications of, (1) how well Colorado pupils performed in terms of occupational cognizance and verbal status and, (2) how well the items held up in terms of stability. Table 1 below gives these cross-study comparisons on the average correct responses at the 4th grade and 11th grade levels.

TABLE 1

Estimated Percent Correct
for All Students on All Items:
Colorado Sample and National Sample on
The Common Status Measures

	Colorado Sample		National Sample		Difference	
Common Status Measure of:	Grade 4	Grade 11	Grade 4	Grade 11	Grade 4	Grade 11
Basic Verbal Status	74.3	66.1	67.6	59.0	+6.7	+7.1
Occupational Cognizance	62.0	67.8	47.0	61.0	+15.0	+6.8

These results are heartening in two respects. First, Colorado educators may take some satisfaction that Colorado children performed well, relative to the national sample, in verbal status and occupational cognizance. Second, the consistency of the scores shows stability in the items; no great exception was noted in the trend of the scores, except possibly in the occupational cognizance items at the fourth grade level.

Occupational Cognizance

Items on occupational cognizance assessed how much Colorado children and youth know about various occupations. Four aspects were assessed: (1) education needed for, (2) work involved in, (3) occupations related to, and (4) field of work of, a given occupation. Examples follow:

Items Illustrating Elements
of Occupational Cognizance
in the Common Status Measures (CSM)

Example Items

1) Education of training involved:

Which of the following requires the LEAST education:

% correct = 55
4th grade

1. chemist
2. teacher
3. lawyer
X 4. saleslady

2) An item related to #1 above was as follows:

A college education is NOT required to be a:

% correct = 56
4th grade

1. chemist
2. doctor
X 3. carpenter
4. architect

3) Work involved:

Which of the following works mainly with AUTOMOBILES:

% correct = 87
4th grade

1. carpenter
2. pilot
3. chemist
X 4. mechanic

4) Field of work:

Which of the following is not in the field of CONSTRUCTION:

% correct = 77
11th grade

1. draftsman
X 2. impressionist
3. architect
4. lather

Evidence of need. Such data were organized to reveal specific informational needs of Colorado pupils. Again, comparison of Colorado and national scores was instructive.

TABLE 2

Comparison of National with Colorado Scores*
on Elements of Occupational Knowledge
in 4th and 11th Grades

Elements Tested:	% Correct Responses				Average Difference	
	National		Colorado			
	4th	11th	4th	11th	4th	11th
Education or training needed	36	56	50	65	+14	+9
Work involved	57	62	71	65	+14	+3
Occupations related	48	59	64	66	+16	+7
Field of work corresponding	52	65	69	69	+17	+4

*Estimated percentage correct for all pupils taking all items

The table indicates that Colorado's edge over national results is larger in the 4th than in the 11th grade. Colorado 11th graders score [illegible]er than the national sample, indicated in the "difference" column at the [illegible]t; however, the differences achieved by the Colorado 4th graders are [illegible]rably higher than those differences achieved by the Colorado 11th gr[illegible]owest scores, over-all, are indicated in cognizance of "education or [illegible] needed" for a given occupation.

Comparisons among pupil population groups. Perhaps the [illegible] information regarding needs for occupational cognizance can be fou[illegible]n comparing pupil population groups. Comparisons showed some pupil pop[illegible]ion groups to have more low scorers than generally expected. These compar[illegible]re most useful in answering questions raised by the United States Of[illegible]e of Education at the outset of the project to guide analyses of pupil respons[illegible]t items.

Q: What are the distinguishing characteristics of pupils def[illegible] knowledge of occupations?

A: At both 4th and 11th grade levels, several student gro[illegible]s do disproportionate difficulty with questions on occupati[illegible]

> Students from Title I schools comprised one low scoring group; these students come from families with low annual income. similarly, 4th graders from low socio-economic status families had more than their share of difficulty. At both grade levels, American Indian, Negro and Spanish-surnamed American children had more difficulty than the total student population. Eleventh graders who were from bilingual homes or who were girls had more than their share of difficulty with questions on occupations. A single low-scoring student may have several of these characteristics.

Q: Are there significant differences in level of occupational cognizance and verbal status with respect to urbanism and location of school?

A: No significant difference in occupational cognizance was found relating to urbanism of the school districts. Urban students tended to out-score either suburban or rural students, but not to a significant extent; such differences may have been due to chance.

Q: What are the relations among occupational cognizance and characteristics of school and program?

A: Somewhat surprisingly, fourth graders from schools with Title III programs showed up with disproportionately low scores on occupational cognizance. Title III schools have innovative programs not necessarily related to low achievement. Low results in both fourth and eleventh grades also came in from schools with both Title I and Title III programs.

Dr. Robert Heath, referring to low occupational scores of girls in the 11th grade, commented as follows:

> We learned that 11th grade girls in Colorado do poorly in the occupational cognizance item pool. We can probably recognize a historical sex bias in vocational education, and we needn't wait for the women's liberation movement to begin correcting it. A need was identified.

Assessment of such needs from the test results is explained further in the Appendix sections D and E of this report.

Basic Verbal Status

Like the occupational measures, the verbal measures consist of item pools from which items are randomly assigned to test forms. The developer of the items, Dr. Robert Heath of Pacific Educational Evaluation Systems, explained the pools as follows:

> It should be remembered that the Common Status Measures are item pools, not tests. That is, at the fourth-grade level, we have a collection of 72 questions that sample several aspects of pupils' basic verbal status. It follows, then, that we should look to performance on these items first when using the CSM's for the assessment of educational needs.

For example, this item came from the Basic Verbal Status pool for 4th grade:

Example Item	
At six o'clock, Billy heard the alarm clock ring. He turned it off and got out of bed still sleepy.	
	X 1. Billy got out of bed at six o'clock.
% correct = 81	2. Billy was out of bed before six o'clock.
	3. Billy didn't hear the alarm clock.
	4. Billy didn't sleep in his bed last night.

Although Colorado pupils outscored the national sample on Basic Verbal Status, certain student populations within Colorado evidenced certain needs by their responses to items measuring verbal status. Pupil needs in verbal learning are discussed below as answers to questions raised by the United States Office of Education at the outset of the Colorado Evaluation Project.

Q: What is the distribution of functional literacy over the state for pupils in Grades 4 and 11?

A: Groups of students with more than their share of difficulty on verbal items were these in the 4th grade: Negro, Spanish-surnamed Americans, and low socio-economic status groups. In the eleventh grade, low scores came from pupils who were Negro or Spanish-surnamed Americans.

Q: What is the relation between literacy level of pupils and characteristics of schools serving them?

A: Interestingly, elementary schools with Title I programs did not send in scores significantly low; Title I high schools did. Schools with both Title I and III programs sent in scores disproportionately low. No relationships were found between low scores and characteristics of urbanism, and suburbanism or rurality.

Further work. Dr. Robert Heath, developer of the Common Status Measures, commented further on work suggested by the Colorado results.

> . . . we could look at the performance of different groups of pupils (or schools, districts, states, regions, etc.) on reading comprehension questions and on vocabulary

questions. Each of these questions yields curricular-relevant-information. For example, the responses to a vocabulary question will not only tell us how many of what kind of pupils answered correctly, but also if the incorrect responses were "paradigmatic" (work-play), "syntigmatic" (work-hard), "phonologic" (walk-work), based on a spelling similarity (work-word) or based on an opposite (work-relax).

Examples of vocabulary items of the Basic Verbal Status pool for 11th grade follow:

Example Items

Put an X in the numbered circle by the word that is MOST LIKE:

EXPLICIT:

% correct = 74

1. implied
X 2. definite
3. sanguine
4. vague

Put an X in the numbered circle by the word that is NOT:

A BEVERAGE

% correct = 78

1. coffee
2. boullion
3. cider
X 4. despot

. . . fine-grain analysis can be made with each item in the four item pools. We might find, hypothetically, that Spanish-surnamed children in a particular rural area were doing well on most vocabulary items, but consistently poorly on reading comprehension questions. Perhaps an especially bad "English as a Second Language" program that drills on mechanics, but neglects reading comprehension is being used in this area; or perhaps the children were learning the elements of English well, but were given only reading materials that had little relevance to their lives and their cultural setting.

Whatever the reasons, needs have been identified for verbal capabilities among several pupil population groups in Colorado. Hopefully, these assessment results can provide the evidence needed to guide allocation of resources for improvement of Colorado children in the area of verbal learning.

PART IV

CONCLUSIONS AND FURTHER STEPS

After one year of experience, it is now possible to offer several tentative conclusions and plans for further development of the Colorado Evaluation Project.

Conclusions

The pilot project produced information on which to base conclusions of both a procedural and a substantive nature. Hopefully, conclusions of both types will be of use to others interested in gathering evidence of educational outcomes.

Procedure. Multi-matrix sampling, described in Appendix A, was useful in assessing educational outcomes statewide. Randomization in (1) construction of test forms, and (2) the selection of pupils provides samples from which information may be gained at a useful level of reliability; the samples so selected are representative, generally speaking, of all students in Colorado taking all items of their appropriate grade level.

Procedures developed by the Colorado Evaluation Project have several innovative aspects:

(1) Judgements of teachers as to importance of the objectives gained involvement of those close to on-going teaching-learning situations.

(2) Multi-matrix sampling, by which only a few pupils each try a few items, minimized disruption of on going school activities, while producing information on pupil populations.

(3) By specifying capabilities of pupils, the objectives emphasized the basic purpose of the schools: pupil learning.

(4) Computer analysis provided information in useable form in a minute fraction of the time required by hand correction of tests and tabulation of scores.

Substantive aspects. The Colorado Evaluation Project furnished evidence of both goal achievement and lacks thereof. Typical conclusions

which are possible to derive from such evidence are given relating to two goals for education in Colorado.

Goal #1: COMMAND OF THE KNOWLEDGE, SKILLS AND ATTITUDES ESSENTIAL FOR EFFECTIVE LEARNING THROUGHOUT LIFE.

Colorado schools are achieving this goal in part. Assessment results indicate: (1) Colorado scores exceed national scores on commonly-administered items in occupational cognizance and verbal status, two areas of knowledge essential for satisfactory life prospects (2) some aspects of continuing education, such as the ability to use an index, were capabilities in evidence in the assessment results.

Definite needs were in evidence in certain curriculum areas among certain pupil population groups. Language arts items were difficult for the American Indian, Spanish-surnamed Americans, Negro, and Oriental students. Skills of basic reading and logical analysis were among needed capabilities according to the evidence collected. Similarly, low socio-economic status was related to poor performance on language arts items. (See Appendix D.)

Some evidence indicated educational needs of rural population groups in areas of math and cognitive aspects of music. In mathematics, many of the items assessed conceptual development in terms of "modern math," which assumed these concepts as basic to continuing growth and learning in quantitative thinking. "Modern Math" may not be common in rural schools; school music may be absent entirely in some localities.

Knowledge of occupations, essential for reasoned choosing of one's life work, was found lacking by pupils possibly needing it most: the low socio-economic and the minority pupils. Knowing what education or training is needed, type of work, occupations related, and field of endeavor for a particular occupation appears lacking among those populations as identified in Appendix D of this report.

Goal #11: KNOWLEDGE, ATTITUDES, AND SELF-UNDERSTANDING BASIC TO ACHIEVEMENT AND MAINTENANCE OF PHYSICAL AND MENTAL HEALTH

Achievement of this goal was also partial. Colorado children generally know, for example, that people who smoke cigarettes are more likely to get lung cancer and heart disease than people who don't smoke cigarettes. With this information, persons wanting to mount an anti-smoking campaign may do so by some other means than disbursing statistical information; Colorado students already know the risks involved in smoking! Perhaps instruction aimed at attitudes would be time better spent.

In the area of physical education, pupils had general verbal understanding of form in catching, throwing, and other physical skills, such as "keeping your eye on the ball." Such knowledge, imparted by many a coach's admonition for correct form, was in evidence at varying levels of sophistication.

Needs in physical education were in evidence among Colorado girls. They scored significantly low on tests over rules and form relating to specific life-time sports. If achievement of Goal #11 is to be more than just partial, then more attention may be directed toward girls' physical education. (See Appendix D for further comparisons among pupil groups.)

Further Steps

Further steps are planned to make full use of the assessment results which are potentially a gold mine of information regarding goal achievement and lacks thereof. Five steps are recommended.

1. A set of "working papers" will be prepared for each grade level and/or content area. Included will be, (a) indications of student performance on each item for various objectives; (b) critical comments on items and objectives; (c) instructions as to interpretation of results; and (d) summary of educational achievement and needs as stated in this report.

2. A work group of department personnel will scrutinize these "working papers" to: (a) refine objectives and items for content validity; (b) state explicitly further educational needs

as indicated by the data (See Appendix C of this report); (c) recommend possible remedies for needs so identified.

3. Departmental sessions, including Planning and Evaluation Unit members with representative groups, lay and professional, will determine priorities on objectives and standards of acceptable performance on items.

4. Priorities for items and objectives will be determined by Assessment and Planning personnel to be included for re-assessment in a spring assessment program.

5. Concurrently with above activities will be try-out of refined items from this first assessment along with items designed especially for the second assessment project.

The Assessment and Evaluation Unit of the Colorado Department of Education thus plans to assess outcomes of educational programs in Colorado. By presenting solid evidence of learning, Colorado educators may gain and maintain support needed for quality education in Colorado.

Toward Accountability

Colorado's support for education can be described in many ways, but perhaps most tellingly in terms of investments in time, money, and effort. Below, the extent of this commitment is reviewed briefly.

Time. In most districts, schools are in session 180 days each year, some a few days more, some a few days less. Most districts have summer and after-hour programs for makeup, enrichment, and special interest activities. School attendance is required by law for ages 6 to 15, but the average Coloradoan attends school 12.1 years of his life.

Money. Coloradoans spend approximately $750 a year on the average, for each student attending public schools in Colorado. This includes pay for the 28,243 certified staff in the 1,187 public school buildings across the state, materials, and all other goods and services provided by public schools. State funds provide about $225 of this $750, and local funds provide the remaining $525 per pupil, on the average. Our annual dollar investment in the education of the ½ million school pupils was approximately $425 million for the school year last completed.

Effort. Parents and others visiting the schools are impressed with the amount of learning activity underway. Teachers and pupils are engaged in the mentally and physically demanding work of explaining, understanding, testing, reviewing, and performing in a myriad of teaching-learning situations. The hard work of planning and evaluating surrounds that of daily classroom activities.

This report was prepared toward furthering accountability in Colorado schools. Further evidence of learning and of student needs will be forthcoming in subsequent reports. Hopefully, these materials will contribute to the quality education to which all children in Colorado are entitled.

APPENDIX

APPENDIX A

SAMPLING PROCEDURES

SAMPLING PROCEDURES

The Colorado Evaluation Project used multi-matrix sampling procedures. One matrix provided random assignment of tests to districts, another provided random assignment of items to forms, a third matrix provided random assignment of forms to students. By use of these procedures, only a relatively few students each trying a few assessment tasks were able to yield information about capabilities of Colorado students generally. This sampling was done at a small fraction of the cost of that involved for all students in Colorado trying all items.

Such popularly known activities as predicting elections and estimating size and characteristics of television audiences have included sampling procedures. By sampling, information gathered from a relatively few persons can be the basis for estimates for the total population.

In the Colorado Evaluation Project, the basic procedure was randomization whereby each item and each child had an equal chance of being chosen. Random procedures were used in, (1) assignment of tests to districts, (2) assignment of items to forms, and (3) assignment of forms to students, as described below.

Random Assignment of Tests to Districts

Steps in constructing the matrix for random assignment of tests to districts were as follows:

Step 1: Listed all districts in order of size, the smallest first; chose every 6th district to get an adequate sample size of 30, adding Denver independently because of that district's unique size.

Step 2: Placed these districts' names across the horizontal dimension of the matrix and listed the subject areas to be tested down the vertical dimension of the matrix.

Step 3: Plotted distribution of tests generally proportionate to district's size.

(See the 3-page matrix in this Appendix on pages 40, 41 and 42; place pages end-to-end for a complete matrix.)

Random Assignment of Items to Forms

Randomly assigning items to forms produced parallel forms of equal difficulty and length. Each question had an equal chance regarding placement on the form. Contextual clues among items were eliminated through random assignment.

Needed to make parallel test forms were, (1) pools of items, each item with a pool number, each pool assessing a content area at a given grade level, (2) a table of random permutations, and (3) a decision as to how long each form should be for the various tests given. The matrix was constructed as follows:

ITEMS TO FORMS MATRIX

Content Area _____

Grade Level _____

No. *	Form A	Form B	Form C	Form D	Form E
1	17				
2					
3					
4					
5					
6					

*The number of items on the forms should be equal for a given item-pool.

A starting place was selected on the table of random permutations by the test constructor closing his eyes and pointing. This first number was 17. The first item in Form A, then, was the number 17 from the item pool. If the table of random permutations had numbers higher than the number of items in the pool, the test constructor would merely go to the next number listed on the table until an appropriate number was found. No item in the pool was used twice until all items had been used.

Items appearing in more than one form received proportionately more responses. Average number of students responding to each item was approximately 250.

Random Assignment of Forms to Students

A third matrix was constructed to randomly assign forms to students. This procedure was comprised of four steps:

Step 1: Selected schools within each district by choosing every second elementary and every secondary school in the larger districts, every school in the smaller districts.

Step 2: Selected classes from school by listing classes of grade levels to be tested and used the following form to make the random selection of classes (see last page of Appendix A).

Step 3: Using the teachers' class list, pupils were selected by use of table of random numbers.

Step 4: Distributed test forms to students on an equal basis, Form A to first student, B to the second, and so on; each form of each item pool was given to approximately the same number of students.

Allocation and collection of tests was facilitated by use of an accounting sheet listing school, test monitor, grade, subject area, and numbers of test allocated and collected.

References

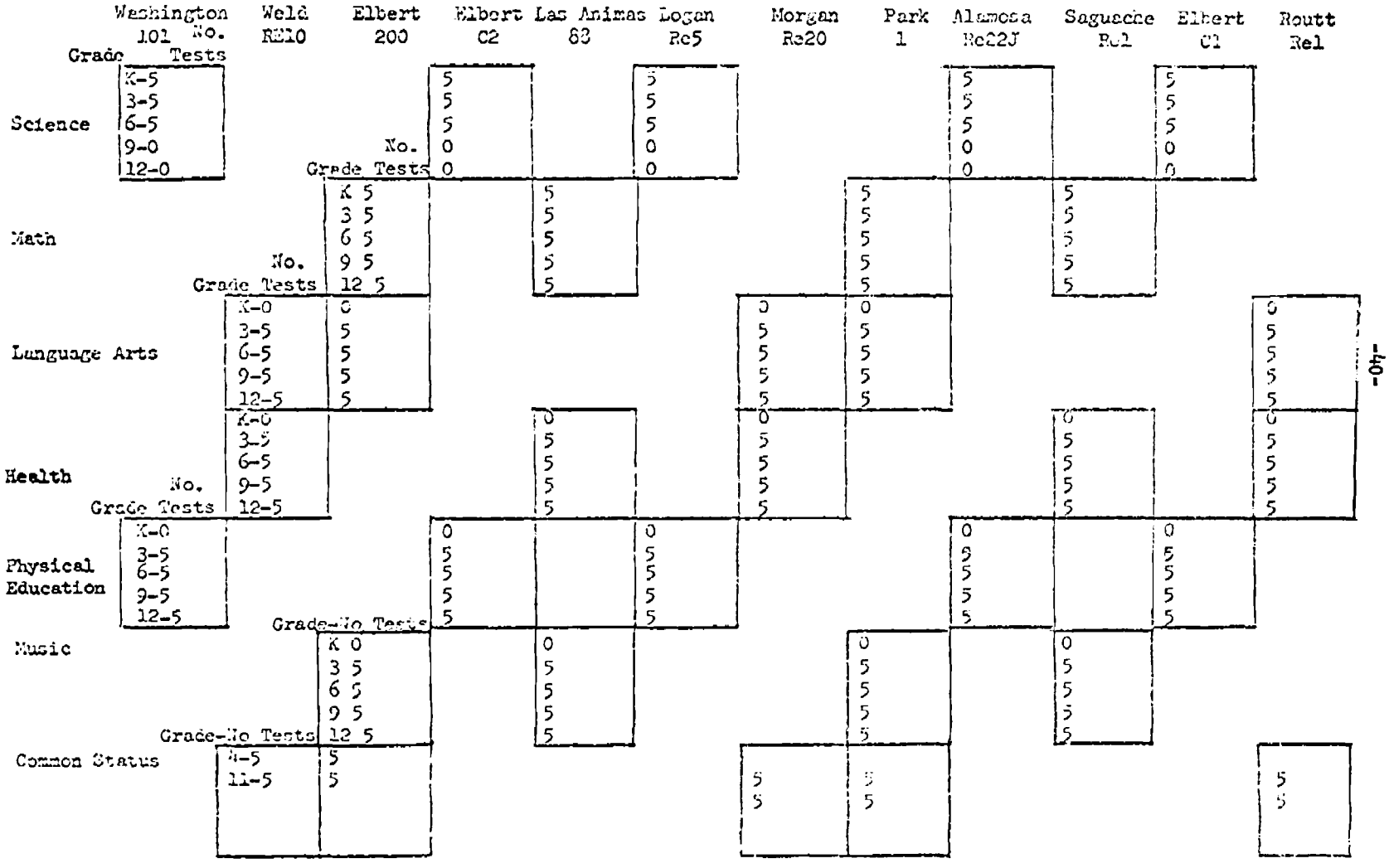
Orlando F. Furno, "Sample Survey Designs in Education - Focus on Administrative Utilization," Review of Educational Research, December 1966, 26:552-563.

Frederick M. Lord, "Item Sampling in Test Theory and in Research Design," Research Bulletin No. 65-22 Educational Testing Service, June 1965, Princeton, New Jersey.

L. J. Cronbach, "Course Improvement Through Evaluation," Teachers' College Record, 1963, 64:672-683.

Robert W. Heath, et. al., "A Development of Educational Status Measures Through Multiple Matrix Sampling," Pacific Educational Evaluation Systems, Box 6566, Stanford, California, 94305.

Distribution of Tests According to District, Content-Area and Grade-level



Grand 1(J)
Prowers Re1
Dolores Re1
Baca Re4
Larimer R-3
Teller Re2
Routt Re2
ClearCreek Re1
Huerfano Re1
Gunnison Re1(J)
Weld Re8
Douglas Re1

Otero R-1	Adams 27J	El Paso 2	Adams 14	Adams 50	Jefferson R-1	Denver 1		TOTALS
	5	15	20	40	150	250	= 530	
	5	15	20	40	150	250	= 530	
	5	15	20	40	150	250	= 530	= 1590
	0	0	0	0	0	0	= 0	
	0	0	0	0	0	0	= 0	
5	5	15	20	40	150	250	= 530	
5	5	15	20	40	150	250	= 530	
5	5	15	20	40	150	250	= 530	= 2650
5	5	15	20	40	150	250	= 530	
5	5	15	20	40	150	250	= 530	
	0	0	0	0	0	0	= 0	
	5	15	20	40	150	250	= 530	
	5	15	20	40	150	250	= 530	= 2120
	5	15	20	40	150	250	= 530	
	5	15	20	40	150	250	= 530	
0	0	0	0	0	0	0	= 0	
5	5	15	20	40	150	250	= 530	
5	5	15	20	40	150	250	= 530	= 2120
5	5	15	20	40	150	250	= 530	
5	5	15	20	40	150	250	= 530	
	0	0	0	0	0	0	= 0	
	5	15	20	40	150	250	= 530	
	5	15	20	40	150	250	= 530	= 2120
	5	15	20	40	150	250	= 530	
	5	15	20	40	150	250	= 530	
0	0	0	0	0	0	0	= 0	
5	5	15	20	40	150	250	= 530	
5	5	15	20	40	150	250	= 530	= 2120
5	5	15	20	40	150	250	= 530	
5	5	15	20	40	150	250	= 530	
	5	15	20	40	150	250	= 510	
	5	15	20	40	150	250	= 510	= 1020

TOTAL= 13,740

FORMS-TO-PUPILS MATRIX

	Science (No. Teachers)	Mathematics (No. Teachers)	Language Arts (No. Teachers)
Grade K		K	K
Grade 3		3	3
Grade 6		6	6
Grade 9		9	9
Grade 12		12	12

	Music No. Teachers)	Physical Education (No. Teachers)	Health (No. Teachers)
Grade K		K	K
Grade 3		3	3
Grade 6		6	6
Grade 9		9	9
Grade 12		12	12

List all classes in alphabetic order by teacher's last name. Start with the first class listed. If more than one class is needed, choose the second one listed.

APPENDIX B

DATA ANALYSIS

DATA ANALYSIS

Analysis of data was planned consistent with the purpose of the Project: to determine discrepancies between objectives and their achievement. The basic piece of information was the percentage of correct responses to each item. Items were placed under their corresponding objective to facilitate comparison for (1) extent of achievement of the objective, and (2) congruence of objectives and test items.

1. For each item and item pool, performance statistics were listed for the total pupil sample and by various sub-categories including: school program participation, urbanism, sex, ethnic background, whether a second language is spoken in the home, and socio-economic status.

2. Statistical operations were performed to obtain a profile of those students who performed in the lower 20% on each subject tested for a given grade level.

3. Performance statistics were also listed for each item and item pool for each school and school district in the sample.

4. For the Common Status Measures, comparisons between national data gathered during the Colorado Evaluation Project were performed.

5. Item quality, objective appropriateness and student performance were discussed for each objective-referenced item pool.

6. For each subject at each grade level, item intercorrelations were obtained.

7. Subject by subject correlations within each grade level and Common Status Measures by subject correlations for adjacent grade levels were also obtained.

8. Two video tapes, one dealing with occupational cognizance at the 11 grade and one dealing with language arts at the 3rd grade were produced. These tapes included interviews with students, teachers, and administrators, testing activity during the Colorado Evaluation Project, classroom activity, and discussions of the evaluation results.

Computer programs for these operations are available from Pacific Educational Evaluation Systems, Box 6566, Stanford, California, 94305.

Content of IBM Data Cards

Subject Area

Grade Level

Test Form

School and District Code

Pupil responses to test items

Pupil Characteristics:

- Student Name Code
- Student's Sex
- Student's National Origin
- 2nd Language Spoken In The Home (yes or no)
- Father's Occupation

School Program Participation
(i.e. Title I, Title III, or both or neither)

IBM Printout Key

Test	Subject (All subject identifications are self-explanatory except: CSM V - Common Status Measures, Verbal; and CSM OC Common Status Measures, Occupational Cognizance.)
GD	Grade
FM	Form
Item	Item Number
Total	Score for total group taking the item or test
District Title No.	
1	Examinees in Title I Target Schools
3	Examine s in Title III Target Schools
B	Examinees in schools which are both Title I and Title III Target Schools
N	Examinees in schools which are neither Title I or Title III Target Schools
Urbanism	
U	Urban
S	Suburban
R	Rural
Sex	
M	Male
F	Female
Ethnic Group	
AI	American Indian
N	Negro
O	Oriental
SA	Spanish-surnamed American
Other	None of the above
2nd Language	
Yes	Yes, a second language is spoken in the home
No	No, a second language is not spoken in the home
SES	Socio-Economic Status (determined by primary supporter's occupation)
Low	Farm worker, unskilled worker, laborer, domestic worker, semi-skilled worker
Middle	Skilled worker, sales agents and representatives, technical, manager of foreman
High	Farm manager or owner, official, professional
Adj. Score	Estimated score which people would have received had they taken the entire item pool.
P of total item pool	Percent correct (obtained by dividing the number of correct responses by the total number of responses
**	Indicates a P of .80 or above for item in question
*	Indicates a P of .20 or below for item in question

TEST	CO EM ITEM	TOTAL	DISTRICT TITLE NO. 1	3	8	URBANISM N	U	S	SEX F	M	F	ETHNIC GROUP A	I	N	O	S	A	2ND LANG OTHER	YES	NO	SES LOW	MID	HIGH
CSM OC	11 A 1																						
FREQ	RIGHT RESP	57	5	25	12	15	44	8	5	32	24	1	2	0	3	45	6	47	4	31	14
FREQ	WRONG RESP	32	4	12	11	5	24	4	4	12	20	3	1	1	5	20	3	27	4	14	4
FREQ	NON RESP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
%	RIGHT RESP	64	55	67	52	75	64	66	55	72	54	25	66	0	37	69	64	63	50	69	77
%	WRONG RESP	35	44	32	47	25	35	33	44	27	45	75	33	100	62	30	33	36	50	31	22
%	NON RESP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL RESP	89	9	37	23	20	68	12	9	44	44	4	3	1	8	65	9	74	8	45	18
CSM OC	11 A 2																						
FREQ	RIGHT RESP	61	6	27	14	14	49	6	6	32	29	2	1	1	4	47	7	50	6	32	14
FREQ	WRONG RESP	28	3	10	9	6	19	6	3	12	15	2	2	0	4	18	2	24	2	13	4
FREQ	NON RESP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
%	RIGHT RESP	68	66	72	60	70	72	50	66	72	65	50	33	100	50	72	77	67	75	71	77
%	WRONG RESP	31	33	27	39	30	27	50	33	27	34	50	66	0	50	27	22	32	25	28	22
%	NON RESP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL RESP	89	9	37	23	20	68	12	9	44	44	4	3	1	8	65	9	74	8	45	18
CSM OC	11 A 3																						
FREQ	RIGHT RESP	61	5	29	14	13	49	8	4	30	31	4	2	0	2	46	3	53	3	29	17
FREQ	WRONG RESP	28	4	8	9	7	19	4	5	14	13	0	1	1	6	19	6	21	5	16	1
FREQ	NON RESP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
%	RIGHT RESP	68	55	78	60	65	72	66	44	68	70	100	66	0	25	70	33	71	37	64	94
%	WRONG RESP	31	44	21	39	35	27	33	55	31	29	0	33	100	75	29	66	28	62	35	5
%	NON RESP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL RESP	89	9	37	23	20	68	12	9	44	44	4	3	1	8	65	9	74	8	45	18
CSM OC	11 A 4																						
FREQ	RIGHT RESP	84	8	37	20	19	64	12	8	41	42	4	2	1	6	63	7	71	8	42	18
FREQ	WRONG RESP	5	1	0	3	1	4	0	1	3	2	0	1	0	2	2	2	3	0	3	0
FREQ	NON RESP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
** %	RIGHT RESP	94	88	100	86	95	94	100	88	93	95	100	66	100	75	96	77	95	100	93	100
%	WRONG RESP	5	11	0	13	5	5	0	11	6	4	0	33	0	25	3	22	4	0	6	0
%	NON RESP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL RESP	89	9	37	23	20	68	12	9	44	44	4	3	1	8	65	9	74	8	45	18

A P P E N D I X C

RATIONALE FOR ASSESSMENT BASED ON OBJECTIVES AND GOALS OF EDUCATION

RATIONALE FOR ASSESSMENT BASED ON OBJECTIVES AND GOALS OF EDUCATION

Objectives in education serve very much like a basket in basketball or a goal post or goal line in football: activities are planned for achievement of a specific goal. Whereas the goals in sports are commonly understood and highly visible, goals for education are often unclear and unstated.

The assumptions underlying the Colorado Evaluation Project were as follows:

1. Objectives can be stated to specify clearly pupil performance without being superficial or trivial. Specification of learner capabilities is possible, but it often leads to exposure of triviality.

2. Stating objectives for specific year-end accomplishments often frees the teacher's creativity rather than thwarting the teacher's creativity. The creative teacher will immediately think of many inspiring methods for reaching a specified objective and will probably find commonly-accepted objectives to be helpful in organizing materials and planning activities.

3. By specifying pupil performance, attention is directed toward the purpose of the school: student learning. Parental attitudes or community politics are seen as accompanying factors, but not the educator's prime responsibility.

4. Objectives can be stated to reflect broad human values, such as learning to learn, positive self-concept and awareness of environment. Any objective can be interpreted mechanically or narrowly, but the creative teacher will see each objective in a broader context of human values.

5. Objectives can specify behaviors important for democratic processes and are not, per se, authoritarian in nature. Leaders in many fields make extensive plans for achievement of specific objectives: the statement and working toward common objectives can exemplify democratic processes.

6. Teachers, administrators, students and interested others can learn to specify in advance what objective they are working toward. Although some teachers may have difficulty in learning to state objectives, others have already done so.

7. Evaluation of pupil achievement of performance objectives provides sound evidence of the effectiveness of a given program. This evidence is more scientific as a basis for decision making than many of the vague impressions often the basis of present decisions.

To help get started on stating curricular objectives, the following components were specified:

Content: materials in a specified content area.

Behavior sought: operations of identifying, naming, describing, constructing, ordering, or demonstrating.

Measuring Instruments: multiple-choice items.

Point of Emphasis: the student

The following table indicates the number and type of objectives produced for the Colorado Evaluation Project

TABLE 3

Number of Objectives Written

by Grade Levels and Content Areas

Level	Health	P.E.	Math	Lang. Arts	Science	Music*	Total
K			8		14		22
3	28	12	10	21	12	55	138
6	27	15	17	14	10	60	143
9	17	26	16	22		49	130
12	15	26	14	21	—	49	125
Totals	87	79	65	78	36	213	558

*Music objectives include several levels of generality.

The following table compares teacher judgements with pupil performances on the objectives used as the basis of the pilot on assessment and evaluation.

A random sample of approximately 2,500 Colorado teachers judged objectives stated in six common content areas: health, language arts, mathematics, music, physical education and science. The teachers rated the objectives on a five point scale as follows:

1 = very important
2 = important
3 = unimportant
4 = very unimportant
5 = not clear

Table 4 below indicates the percentage of teachers judging the various objectives as "important" or "very important" for students to have achieved upon completion of the several grade levels specified.

TABLE 4

Judgement of Curricular Objectives
by Colorado Teachers

Level	Content Area	Percent of Teachers Judging Objectives "Important" or "Very Important"
Kindergarten	Science	69
	Math	65
3rd Grade	Language Arts	84
	Math	75
	Physical Education	47
	Health	65
	Science	53
6th Grade	Language Arts	87
	Math	70
	Physical Education	79
	Health	73
	Science	55
9th Grade	Language Arts	79
	Math	61
	Health	58
12th Grade	Language Arts	78
	Math	81
	Health	57
	Total Average	68.7

COMPARISON OF NORM-REFERENCED AND OBJECTIVE-REFERENCED TESTS

Point of Comparison	Norm-referenced	Objective-referenced
Purpose:	Determine a pupil's grade-level achievement Predict a pupil's future academic success	Determine extent to which objectives are being achieved
Criteria for Item Construction:	Items should discriminate - be easy for some, hard for others (pre-determined tests)	Items should test whether student can perform behavior specified by the objective (tailor-made tests)
Validation:	Correlation among items and with other tests Item analysis for discrimination between high and low scorers	Judgement regarding correspondence of items to objectives (content validity) and inspection of items for clarity, vocabulary level, etc.
Testing Procedure:	Each student takes a complete test	Items may be randomly assigned to forms of convenient length; pupils may be randomly selected.
Achievement Standard:	Average of other pupils of the same age	Performance of specified behavior (Yes or No)
Reporting of Results:	Grade-level achievement norms for individuals or groups	Percentages of populations able to perform specified behavior
Reliability Check:	Test-retest stability of tests Measures of internal consistency	Test-retest stability of items
Implications for Teaching:	Teaching for the test unfairly constrains classroom activity and invalidates test	Teaching for the objectives is desirable and expected

Source: W. J. Popham and T. R. Husek, "Implications of Criterion-Referenced Measurement, Journal of Educational Measurement. Spring 1969, 6:1-9.

HEALTH

Objectives for the end of the Third Level

Safety and Accident Prevention

2. Example given in instructions.

4. The pupil will be able to reduce physical hazards in the home environment as demonstrated by the child's ability to identify which of a list of practices are good safety rules to follow and which are not.

6. The pupil will be able to demonstrate a knowledge of methods of reducing physical hazards by being able to match a dangerous situation with the appropriate solution for reducing the danger.

8. The pupil will be able to recognize community efforts to develop youth safety programs by matching community agencies (e.g. fire department, police department) with the work that they are doing.

10. The pupil will be able to evaluate accident reports as demonstrated by his ability to match a list of accidents with a list of causes.

Mental, Emotional and Social Health

12. The pupil will demonstrate knowledge of making friends by identifying which of a list of actions are helpful in making friends and which are not.

14. The pupil will demonstrate knowledge of proper procedures in associating with others in play activities by identifying which of a list of procedures are proper and which are not.

16. The pupil will demonstrate his ability to accept responsibility by indicating agreement or disagreement to a list of tasks appropriate for his age group.

18. The pupil will learn the proper behavior in accordance with everyday social situations as demonstrated by his ability to determine whether a list of behaviors are social or not.

20. The pupil will acquire the proper mental attitude in facing problems and making decisions as indicated by his responses to a list of problem statements.

22. The pupil will be able to accept differences, to appreciate the feelings of others, and to evaluate criticism as demonstrated by his responses to a list of problem statements.

24. The pupil will demonstrate knowledge of how mental, emotional, and social facets of personality reflect upon others by his ability to match a list of mental, emotional and social characteristics with their appropriate effects on others.

Family, School and Community Health

26. The pupil will be able to identify the roles that the family, school and community play in providing for our nation's health by his ability to list three health practices of the family, of the school, and of the community that contribute to our nation's well-being.

28. The pupil will understand the necessity for careful selection of professional and community health services as demonstrated by his ability to identify the correct professional service need when given specific situations.

30. The pupil will understand the functions of official, voluntary, professional, local, state and federal organizations which promote the safety of people or organizations with their appropriate functions.

32. The pupil will learn personal health habits which will be helpful for maintaining his own health and the health of his family, school, and community as demonstrated by his ability to identify which habits of a list are improper and which are proper.

34. The pupil will value practicing personal health habits which are helpful in maintaining his own health and the health of his family, school, and community as indicated by his responses to a list of statements of health habits.

36. The pupil will identify the functions of community and school health workers as demonstrated by his ability to match a list of health workers with their appropriate functions.

38. The pupil will appreciate the function of community and school health workers as indicated by his reaction to a list of position titles.

Personal Health

40. The pupil will demonstrate his knowledge of foods by listing the four basic foods contained in a well-balanced diet.

42. The pupil will appreciate the value and function of the eyes and ears by his response to a true-false test covering this area.

44. The pupil will demonstrate his knowledge of preventing dental caries and maintaining dental health by completing a multiple choice test in these areas.

46. The pupil will demonstrate his knowledge of personal cleanliness by choosing the facts from a list of facts and fallacies in this area.

48. The pupil will demonstrate his knowledge of school health personnel by identifying each with matching function on a list developed by the teacher.

50. The pupil will demonstrate his knowledge of proper health habits by selecting correct responses from a list of concepts and misconceptions in this area.

Personal Health (Cont'd)

52. The pupil will demonstrate his knowledge of the health department's responsibility by completing a true-false test in this area.

Safety and Accident Prevention

54. The pupil will demonstrate his knowledge of safety and accident prevention by completing a multiple choice test in these areas.

Mental, Emotional and Social Health

56. The pupil will demonstrate his knowledge of mental health by selecting correct responses from a list of concepts and misconceptions in this area.

HEALTH

Objectives for the end of the Sixth Level

Safety and Accident Prevention

2. Example given in instructions.

4. The pupil will be able to reduce hazards during natural disasters and enemy attacks by his ability to make a list of safe practices to be used under disaster conditions.

6. The pupil will be able to demonstrate methods of reducing hazards in hunting, fireworks and fire prevention by being able to correctly identify safe practices listed for each of these hazards.

8. The pupil will be able to recognize community safety programs by matching a list of agencies (civil defense, hospital, Red Cross, Safety Council) with accident prevention activities they engage in.

10. The pupil will be able to analyze accident data by his ability to relate causes to home and school accidents on standard report forms provided.

Mental, Emotional and Social Health

12. The pupil will demonstrate knowledge of making friends by listing qualities that friends should have.

14. The pupil will demonstrate the proper procedures in associating with others, identifying a list of acceptable social skills.

16. The pupil will demonstrate his ability to accept responsibilities and decisions by his responses to a true-false test of social attitudes.

18. The pupil will demonstrate his knowledge of proper social behavior by his ability to select proper situations from a list of mixed proper and improper behavioral situations.

20. The pupil will acquire the proper mental attitude in solving problems and making decisions as indicated by his responses to a true-false test of problem and decision situations.

22. The pupil will be able to accept differences, to appreciate others' feelings and to evaluate criticism as demonstrated by his responses to a true-false test of situations involving these areas of concern.

24. The pupil will demonstrate knowledge of how mental, emotional and social facets of personality reflect on others by his response to a multiple choice test of factors and influences in these areas of concern.

Family, School and Community Health

26. The pupil will be able to recognize the roles of the family, school and community by listing several family health practices, school health program features and community, state or federal laws which influence the nation's health in a positive way.

28. The pupil will demonstrate his knowledge of careful selection of community health services by actually selecting several from a list of available and hypothetical services.

30. The pupil will understand the functions of official, voluntary and professional organizations which promote safety at all levels by selection from a check list of mixed agencies that promote other services as well as safety.

32. The pupil will demonstrate his knowledge of health habits which are helpful in maintaining personal, family, school and community health by identifying the proper habits on a list of mixed habits including those that are appropriate.

34. The pupil will improve his attitudes toward practicing health behaviors and habits by his positive responses to a true-false list of habits that include helpful as well as harmful habits for personal, family, school and community health.

36. The pupil will demonstrate his understanding of the function of community and school health workers by making a list of several and describing their functions briefly.

38. The pupil will illustrate his appreciation of the function of school and community health personnel by eliminating the non-health personnel from a list of health and non-health workers and their functions.

Personal Health

40. The pupil will indicate his knowledge of nutrition related to food selection, growth and weight control by completing a multiple choice test in these areas.

42. The pupil will demonstrate his knowledge of nutrients in adequate diets by choosing the facts from a list of facts and fallacies in this area.

44. The pupil will demonstrate his knowledge of dental health by selecting correct responses from a list of concepts and misconceptions in this area.

46. The pupil will demonstrate his knowledge of care of the body by completing a true-false test in this area.

Prevention and Control of Disease

48. The pupil will demonstrate his knowledge of diseases, physical examinations and immunizations by completing a multiple choice test in these areas.

Alcohol, Drugs, Tobacco and Health

50. The pupil will demonstrate his knowledge of alcohol by matching a list of types of alcoholic beverages with descriptions provided by the teacher.

52. The pupil will demonstrate his knowledge about tobacco by completing a true-false test of facts concerning smoking and its affects on health.

54. The pupil will demonstrate his knowledge of marajuana and LSD by filling blanks in a short essay on the subject.

HEALTH

Objectives for the end of the Ninth Level

Growth and Development

2. Example given in instructions.

4. The pupil will demonstrate his knowledge of physical growth and organic fitness by completing a multiple choice test in these areas.

6. The pupil will demonstrate his knowledge of emotional stability and social competence by choosing the facts from a list of facts and fallacies in these areas.

8. The pupil will apply his knowledge of the physical makeup and uses of the body by matching a list of the body systems with their functions.

Personal Health Practices

10. The pupil will demonstrate his knowledge of nutrition related to food selection, growth and weight control by selecting correct responses from a list of concepts and misconceptions in these areas.

12. The pupil will demonstrate his knowledge of the skin; its appearance and grooming by completing a true-false test in these areas.

14. The pupil will express his personal practices relating to dental care by completing a multiple choice test in this area.

Physical and Mental Health

16. The pupil will demonstrate his knowledge of physical growth and organic fitness by completing a multiple choice test in these areas.

18. The pupil will demonstrate his knowledge of emotional stability and social competence by completing a true-false test in these areas.

20. The pupil will demonstrate his knowledge of poor mental and emotional practices and disorders by matching a list of poor practices with the resulting disorders.

Effects of Harmful and Destructive Substances

22. The pupil will demonstrate his knowledge about alcohol and tobacco by choosing the facts from a list of facts and fallacies in these areas.

24. The pupil will demonstrate his knowledge of marajuana, LSD, barbituates, amphetamines and narcotics by matching a list of sophisticated drugs with the common symptons of abuses of each type.

Effects of Harmful and Destructive Substances (Cont'd)

26. The pupil will demonstrate his knowledge of rationales for drug abuse by listing several reasons for experimenting with the use of drugs.

Environmental Sanitation

28. The pupil will demonstrate his knowledge of the need for sanitation measures and available community health services by completing a multiple choice test in these areas.

30. The pupil will demonstrate his knowledge of an effective home-school-community sanitation program by participation in a community-wide anti-litter campaign.

First Aid

32. The pupil will demonstrate his knowledge of accident prevention and good safety practices by selecting correct responses from a list of concepts and misconceptions in these areas.

34. The pupil will demonstrate his understanding of what to do . . . what not to do in case of sudden illness or accident by completing a multiple choice test on first aid procedures.

HEALTH

Objectives for the end of the Twelfth Level

School and Community Health Services

2. Example given in instructions.

4. The pupil will demonstrate his knowledge of community health services by completing a true-false test in this area.

6. The pupil will demonstrate his understanding of school health education and health services by indicating on a list of school program features which are health and which are non-health.

Prevention and Control of Diseases

8. The pupil will demonstrate his knowledge of diseases and their causes by completing a multiple choice test in these areas.

10. The pupil will demonstrate his knowledge of personal and community health relating to disease prevention and control by selecting correct responses from a list of concepts and misconceptions in these areas.

Family Living and Sex Education

12. The pupil will interpret his values upon which ideals, standards and philosophy of family living by completing a multiple choice test indicating agreement or disagreement with positive values in these areas.

14. The pupil will cite his understanding of the traits in a prospective husband or wife which lead to a wholesome, healthy and happy marriage by completing a true-false test of positive and negative traits in these areas.

16. The pupil will apply his knowledge of the psychological, physiological, social and moral implications of sexual maturity and family relationships by matching a list of positive implications with corresponding situations in these areas.

Emergency Procedures

18. The pupil will demonstrate his knowledge of civil defense and survival preparedness by completing a multiple choice test or radiological fallout protection and emergency shelters.

20. The pupil will apply his understanding of immediate care to an injured victim by selecting correct responses from a list of concepts and misconceptions in this area.

Consumer Health Education

22. The pupil will demonstrate his knowledge of nostrums and quackery by preparing a list of common health foods and match them with the claims that are made for each.

24. The pupil will apply his understanding of misleading advertising techniques by completing a true-false test covering this area.

26. The pupil will demonstrate his knowledge of reliable information regarding foods, drugs and cosmetics by responding to a multiple choice test covering these areas.

Health Careers

28. The pupil will indicate his knowledge of training and professional program preparation by matching them with a list of careers and positions.

30. The pupil will demonstrate his knowledge of scholarships and financial assistance by listing as many sources as he knows.

LANGUAGE ARTS

Objectives for the end of the Third Level

2. Example given on instruction sheet.

4. Given a random sampling of at least twenty dictated words from the Rinsland or/other word list, the student will apply his communication skills by correctly writing and using the words in sentences.

6. Using a class list of words the student will demonstrate his ability to synthesize new words by:

   a. Changing the beginning consonant sound
   b. Changing the ending consonant sound
   c. Adding prefixes
   d. Adding suffixes
   e. Building compound words
   f. Forming contractions
   g. Creating antonyms, homonyms, and synonyms

8. The student applies sight-recognition skills (context, configuration and illustrative clues) in reading as measured by a standardized reading test.

10. The student applies word-analysis skills by attacking new words in reading, spelling, and writing as measured by a check list.

12. The student will demonstrate his knowledge of new words learned as measured by standardized vocabulary pre-test and post-test.

14. The student is able to synthesize by expanding simple sentences in oral or written communication by adding elements of modification (adjectives, adverbs, prepositional phrases and clauses) and by compounding subject and/or predicates, (i.e., Paul found some candy. Paul ate the candy. Paul found some chocolate candy and ate it greedily on the playground.)

16. The student demonstrates his ability to proofread a given exercise by applying the following mechanics of writing:

   a. Capitalization
   b. Punctuation
   c. Word usage (substitution of correct forms for faulty ones)
   d. Spelling

18. Given a problem, such as reaching one location from another, the student will be able to synthesize a set of instructions which his peers are able to follow satisfactorily. (Problem can vary.)

20. The student is able to apply the skill of consulting the dictionary or glossary as measured by:

   a. Alphabetization (using up to three letters)
   b. Use of guide words
   c. Accents, diacritical marks, and symbols
   d. Word meaning
   e. Syllabication

22. The pupil will demonstrate his application of library skills by selecting and checking out material for his personal use, taking proper care of it, using it, and returning it to the library.

24. The pupil will apply his ability to use the parts of a book with facility as measured by an exercise directing the student to locate and use the following parts:

    a. Title page
    b. Table of contents
    c. Glossary
    d. Illustrations (maps, graphs, etc.)

26. The pupil will apply his paragraphing skills by writing five sentences related to a controlling idea, i.e., description of a family member, friend, pet, hobby, etc.

28. The pupil will apply his functional and imaginative writing skills by composing a letter, a poem, story, or short report that a fellow student is able to read and understand.

30. Given a paragraph to read silently, the pupil's comprehension is measured by his ability to:

    a. Locate information
    b. Name major and minor ideas
    c. Interpret facts and feelings
    d. Remember sequence of events
    e. Draw logical conclusions.

32. The pupil is able to evaluate ideas and experiences gained from reading and mass media in solving problems, developing interests, and differentiating between factual and nonfactual material and essential and nonessential material as measured by comprehension tests.

34. The pupil will apply courteous speaking and listening skills in telephone conversations, group discussions, and introductions as measured by a teacher check list.

36. The pupil will apply his ability to read orally with fluency and expression by reading a selected, grade-level paragraph similar to one taken from the Gray Oral Reading Test, or from a comparable informal reading inventory.

38. The pupil applies his listening skills by recognizing and interpreting spoken language and implied meanings as measured by his ability to comment and react intelligently to spoken language.

40. The pupil will apply that English language dialect necessary for academic purposes of communication as measured by his ability to listen, speak, read, and write in that dialect.

42. The pupil applies verbal and nonverbal skills (word choice, figurative language, facial expressions, bodily movements and gestures) in an oral presentation of an idea, event, or narrative as measured by teacher check list.

LANGUAGE ARTS

Objectives for the end of the Sixth Level

2. Example given on instruction sheet.

4. Given a random sampling of at least twenty dictated words from the Rinsland or other word list, the student will apply his communication skills by correctly writing and using the words in sentences.

6. The pupil has expanded his vocabulary and word-analysis skills as measured by his ability to recognize and apply:

   a. Contextual clues
   b. Configuration
   c. Illustrative clues (pictures, charts, graphs, etc.)
   d. Words which represent abstract ideas
   e. Precise descriptive words
   f. Figurative language

8. The pupil will demonstrate his knowledge of new words learned as measured by standardized vocabulary pre-test and post-test.

10. The pupil will be able to analyze written material and mass media as measured by his ability to see relationships, make inferences, draw conclusions, identify plot and characterization, and recognize conflict according to teacher check lists.

12. The pupil will apply the skill of varying his reading rate according to purpose as measured by timed tests.

14. The pupil applies skill in use of research tools and techniques as measured by his ability to select appropriate reference materials (dictionaries, encyclopedias, maps, charts, etc.) to use index and other guides, to take notes, to outline, to summarize, to cite references, etc.

16. The pupil will demonstrate his ability to synthesize an oral or written composition in which he has chosen a suitable topic, selected relevant supporting details, and organized material in logical and interesting sequence as measured by teacher check lists.

18. The pupil applies skills of functional and imaginative writing in various compositions (friendly and business letters, poems, stories, dialogues, etc.) as measured by teacher check lists.

20. The student applies the following writing skills when proofreading personal writing or given exercises:

   a. Capitalization
   b. Punctuation
   c. Appropriate word usage
   d. Spelling

   as measured by a teacher check list.

22. The pupil applies the technique of combining verbal and nonverbal skills in oral presentation of an idea, event, or narrative as measured by a check list.

24. The pupil applies appropriate speaking and listening skills when:

    a. Making announcements
    b. Giving reports
    c. Making and acknowledging introductions
    d. Giving and receiving directions
    e. Participating in group discussions and conversation

    as measured by a check list.

26. Given a selected grade-level exercise, the pupil will apply the skill of reading orally with fluency and expression as measured by a check list of criteria for oral expression.

28. The pupil will apply that English language dialect necessary for academic purposes of communication as measured by his ability to listen, speak, read, and write in that dialect.

LANGUAGE ARTS

Objectives for the end of the Ninth Level

2. Example given on instruction sheet.

4. The pupil applies a personal spelling attack and mastery as measured by a teacher check list.

6. The pupil will apply reading, speaking, listening, and writing vocabularies (i.e., knowledge of prefixes, suffixes, roots, antonyms, homonyms, synonyms, and contextual clues) as measured by a standardized vocabulary test.

8. The pupil is able to utilize locational skills in consulting study aids, dictionaries, and other reference sources and to evaluate reliability and value of those sources as measured by check lists or other tests.

10. The pupil applies proofreading skills in a given exercise as measured by his ability to correct or improve:

    a. Clearness of meaning
    b. Logical organization and development
    c. Variety and word choice
    d. Sentence structure
    e. Mechanics (capitalization, punctuation, grammar, spelling).

12. Given printed material to read silently the pupil's comprehension is measured by his ability to:

    a. Locate information
    b. Name major and minor ideas
    c. Interpret facts and feelings
    d. Remember sequence of events
    e. Draw logical conclusions
    f. Recognize prejudices (his own and the writer's) and propaganda techniques
    g. Name author's purpose
    h. Read for his purposes.

14. The pupil is able to demonstrate his knowledge of the basic sentence patterns in the English language as measured by his ability to recognize and list the different patterns.

16. The pupil knows the major grammatical devices of English (i.e., word order, inflection, and use of structure words) as measured by his ability to use these devices in written work.

18. The pupil knows the following concepts about the English language:

    a. Language changes constantly
    b. Change is normal
    c. The spoken language is the language
    d. Correctness rests upon usage
    e. All usage is relative

    as measured by a language test.

20. The pupil applies skill of varying the spoken and written language to adapt to the occasion, audience, and purpose as measured by his ability to make sense to different audiences.

22. The pupil applies oral communication skills as measured by reading in an audience situation audibly, clearly, and expressively, according to a teacher check list of criteria.

24. The pupil will apply the skill of varying his rate of reading according to his purpose, as measured by a timed test.

26. The pupil applies independent research methods by preparing and presenting oral and written information on a topic, as measured by a check list that includes the following skills:

    a. Note taking
    b. Summarizing
    c. Information gathering from more than one source
    d. Footnoting
    e. Quoting
    f. Citing references
    g. Drawing inferences
    h. Organizing
    i. Outlining

28. The pupil will apply that English language dialect necessary for academic purposes of communication, as measured by his ability to listen, speak, read, and write in that dialect according to a predetermined criteria.

30. The pupil applies his listening skills by recognizing and interpreting spoken language and implied meanings as measured by his ability to answer questions about material heard.

32. Given a topic, a pupil applies his writing skills (i.e., to state topic directly or indirectly, state his purpose for writing, define his audience and his voice, role of speaker, and show his mastery of paragraph development skills and mechanics) as measured by a written composition.

34. Given an appropriate short story, a passage from a novel, or a television play, the pupil knows the chief facts about setting, characters, and conflict as measured by a test.

36. Given an appropriate poem or popular song, the pupil analyzes by:

    a. Identifying the author's purpose
    b. Listing words, phrases, or images that contribute to it
    c. Stating how particular words or images create responses relevant to the purpose

    as measured by a test.

38. Given one viewpoint about a controversial subject, the pupil can analyze by locating, differentiating, and listing alternate viewpoints (from mass media and material centers) according to the teacher's criteria.

40. Given several versions of essays, articles, or advertisements, the pupil will evaluate the purpose and author's success in achieving that purpose by identifying faulty logic and propaganda techniques (i.e., loaded words, glittering generalities, etc.).

42. Given a situation demanding speaking skills that involve group processes, or social speaking skills or creative efforts, the pupil will apply those skills necessary to accomplish a predetermined purpose.

44. The pupil is able to apply such semantic principles as denotation and word origins, and vocabulary growth, as measured by tests.

2. Example given in instructions.

4. The pupil applies a personal spelling attack and mastery as measured by a teacher check list.

6. The pupil will apply reading, speaking, listening, and writing vocabularies (i.e., knowledge of prefixes, suffixes, roots, antonyms, homonyms, synonyms, and contextual clues) as measured by a standardized vocabulary test.

8. The pupil is able to utilize locational skills in consulting study aids, dictionaries, and other reference sources and to evaluate reliability and value of those sources as measured by check lists or other tests.

10. The pupil applies proofreading skills in a given exercise as measured by his ability to correct or improve:

    a. Clearness of meaning
    b. Logical organization and development
    c. Variety and word choice
    d. Sentence structure
    e. Mechanics (capitalization, punctuation, grammar, spelling).

12. Given printed material to read silently the pupil's comprehension is measured by his ability to:

    a. Locate information
    b. Name major and minor ideas
    c. Interpret facts and feelings
    d. Remember sequence of events
    e. Draw logical conclusions
    f. Recognize prejudices (his own and the writer's) and propaganda techniques
    g. Name author's purpose
    h. Read for his purposes.

14. The pupil knows the major grammatical devices of English (i.e., word order, inflection, and use of structure words) as measured by his ability to use these devices in written work.

16. The pupil knows the following concepts about the English language:

    a. Language changes constantly
    b. Change is normal
    c. The spoken language is the language
    d. Correctness rests upon usage
    e. All usage is relative

    as measured by a language test.

18. The pupil applies skill of varying the spoken and written language to adapt to the occasion, audience, and purpose as measured by his ability to make sense to different audiences.

20. The pupil applies oral communication skills as measured by reading in an audience situation audibly, clearly, and expressively, according to a teacher check list of criteria.

22. The pupil will apply the skill of varying his rate of reading according to his purpose, as measured by a timed test.

24. The pupil applies independent research methods by preparing and presenting oral and written information on a topic, as measured by a check list that includes the following skills:

    a. Note taking
    b. Summarizing
    c. Information gathering from more than one source
    d. Footnoting
    e. Quoting
    f. Citing references
    g. Drawing inferences
    h. Organizing
    i. Outlining

26. The pupil will apply that English language dialect necessary for academic purposes of communication, as measured by his ability to listen, speak, read, and write in that dialect according to a predetermined criteria.

28. The pupil applies his listening skills by recognizing and interpreting spoken language and implied meanings as measured by his ability to answer questions about material heard.

30. Given a topic, a pupil applies his writing skills (i.e., to state topic directly or indirectly, state his purpose for writing, define his audience and his voice, role of speaker, and show his mastery of paragraph development skills and mechanics) as measured by a written composition.

32. Given an appropriate short story, a passage from a novel, or a television play, the pupil will identify (the chief facts about setting, characters, conflict, and the theme) so he may evaluate the work's credibility and the universality of its theme as measured by tests.

34. Given an appropriate poem or popular song, the pupil synthesizes the author's main purpose as measured by a test.

36. Given one viewpoint about a controversial subject, the pupil can analyze by locating, differentiating, and listing alternate viewpoints (from mass media and material centers) according to the teacher's criteria.

38. Given several versions of essays, articles, or advertisements, the pupil will evaluate the purpose and author's success in achieving that purpose by identifying faulty logic and propaganda techniques (i.e., loaded words, glittering generalities, etc.)

40. Given a situation demanding speaking skills that involve group processes, or social speaking skills or creative efforts, the pupil will apply those skills necessary to accomplish a predetermined purpose.

42. The pupil is able to apply such semantic principles as denotation and word origins, and vocabulary growth, as measured by tests.

MATHEMATICS

Objectives for the end of the Kindergarten Level

2. Example given on instruction sheet.

4. Pupils will display knowledge in Mathematics by identifying sets of objects as to the size of the objects, the shape of the objects, and the similarities and differences of the objects.

6. Pupils will indicate the ability to analyze objects by ordering them as to their length, weight, and size.

8. Pupils will display knowledge in Mathematics by naming and ordering the numbers one through ten.

10. Pupils will indicate comprehension of time intervals by making gross distinctions concerning time intervals and describing how we measure these intervals.

12. Pupils will indicate the ability to analyze sets of at least two objects by ordering the objects A and B as ($A \supset B$, $A \subset B$ or $A = B$).

14. Pupils will indicate the ability to comprehend cardinality of sets by naming the number contained in the set.

16. Pupils will indicate the ability to synthesize two objects by identifying and placing two objects on a given space outline.

Objectives for the end of the Third Level

2. Example given on instruction sheet.

4. Pupils will indicate comprehension concerning quantities of large and small size and great and small distances by naming large and small numbers that approximate the size or distance.

6. Pupils will show ability in analysis and synthesis by demonstrating grouping, separating, and regrouping sets of objects by given classification and separation schemes.

8. The ability of application is shown by pupils through applying a rule to show the inverse operations of addition -- subtraction (eg. 9 / 7 = 16.)

10. Pupils will display knowledge concerning time measurement by naming correct times for given problems.

12. Pupils indicate comprehension of objective data treatment by describing information in tabular or graphical form. These displays should include line graphs, circle graphs, and bar graphs to indicate relationships between variables.

14. Pupils can indicate analysis through problem solving of word problems by describing the problem with a mathematical sentence and applying a rule to solve the given problem.

16. Pupils should indicate application in using the addition and multiplication algorithms by applying these rules to solve addition problems through 2 seven digit numbers and multiplication problems of 2 digit numbers.

18. Pupils display knowledge of money by identifying change in coins with purchase amounts up to $5.00.

20. Pupils will indicate ability to analyze by constructing a market value continium based on a given set of objects or pictures of objects.

MATHEMATICS

Objectives for the end of the Third Level

2. Example given on instruction sheet.

4. Pupils will indicate comprehension concerning quantities of large and small size and great and small distances by naming large and small numbers that approximate the size or distance.

6. Pupils will show ability in analysis and synthesis by demonstrating grouping, separating, and regrouping sets of objects by given classification and separation schemes.

8. The ability of application is shown by pupils through applying a rule to show the inverse operations of addition -- subtraction (eg. 9 / 7 = 16.)

10. Pupils will display knowledge concerning time measurement by naming correct times for given problems.

12. Pupils indicate comprehension of objective data treatment by describing information in tabular or graphical form. These displays should include line graphs, circle graphs, and bar graphs to indicate relationships between variables.

14. Pupils can indicate analysis through problem solving of word problems by describing the problem with a mathematical sentence and applying a rule to solve the given problem.

16. Pupils should indicate application in using the addition and multiplication algorithms by applying these rules to solve addition problems through 2 seven digit numbers and multiplication problems of 2 digit numbers.

18. Pupils display knowledge of money by identifying change in coins with purchase amounts up to $5.00.

20. Pupils will indicate ability to analyze by constructing a market value continium based on a given set of objects or pictures of objects.

MATHEMATICS

Objectives for the end of the Sixth Level

2. Example given on instruction sheet.

4. The pupil will indicate comprehension of numeration systems by describing a given number like 3645 in expanded notation form $(3 \times 10^3) + (6 \times 10^2) + (4 \times 10^1) + (5 \times 10^0)$.

6. The pupil will indicate knowledge of scientific notation by describing numbers like 340,000 as 3.4×10^5. He will be able to order a given set of numbers written in scientific notation from smallest to largest.

8. The pupil will indicate application of the cancellation laws of addition and multiplication by naming the solution sets of number sentences like $a + 6 = 9$ or $3a = 12$.

10. The comprehension of non-metric geometry will be shown by describing definitions of geometric figures using set language.

12. Pupils will be able to apply constructions demonstrating angular bisection, perpendiculars to line segments, bisection of line segments, and perpendiculars to a line from a point not in the line.

14. Pupils will indicate comprehension in measurement by using standard units in applying a rule to solve length, area, and volume problems.

16. The pupil indicated comprehension of indirect measurement techniques by demonstrating his ability to find distances or heights of objects.

18. The pupil will show ability to analyze relations between two given variables by assigning number values, and describing the relationship graphically. $\triangle + \square = 7$.

20. Evaluation of given number sentences will be indicated by pupils distinguishing the truth or falsity of the number sentences.

22. Pupils will indicate ability to apply knowledge of inequalities by identifying solution sets for sentences like $\square > 3$ or $5 + \square < 6$.

24. Pupils will indicate explicit knowledge of the algorithms for addition of columns of more than two numbers, multiplication and dimensions of integers, rational numbers and decimals.

26. Pupils will indicate abilities of synthesis and evaluation by interpreting a graphical representation of the functional relationship between two variables by interpolating between given values and exprapolating beyond known values.

28. Pupils will indicate comprehension of number systems and modular systems by identifying the identity element and inverses of a given number or element.

30. A pupil can construct sentences to indicate commutativity and associativity for a given operation to indicate an application of rules.

32. The pupil can demonstrate knowledge of directed numbers and their use by constructing vector proofs for examples like speed and distance or speed and time.

34. Pupils can indicate application of his understanding of similar figures by interpreting the figures as scale models.

Objectives for the end of the Ninth Level

2. Example given on instruction sheet.

4. The pupil can indicate analysis by collecting and organizing data by means of graphs and tables, identifying the measures of central tendency (mean, median, and mode.)

6. The pupil will indicate comprehension of statistical variance by interpreting given data to determine the standard deviation and its application in ranking random samples.

8. Pupils will indicate ability to apply the principles of probability by interpreting possible outcomes of given situations.

10. Pupils will indicate application of his knowledge of logical connectives such as "and", "if-then", "if-and only if", to distinguish and to construct simple deductive arguments.

12. Pupils will indicate comprehension of functions and graphs by constructing graphs to display functional relations.

14. Pupils will indicate knowledge of functional notation by describing solutions to given problems in functional notation.

16. Pupils will indicate comprehension of the fundamental operations of arithmetic by demonstrating ability to solve computational problems with fractions and decimals.

18. Pupils will indicate comprehension of structural properties of the several number systems by identifying the property for given examples like:

Commutativity	$a \diagup b = b \diagup a$	$a \times (b \diagup c) = (a \times b) \diagup (a \times c)$	
	$a \times b = b \times a$	Distributative property of addition over multiplication	
Associativity	$a \diagup (b \diagup c) = (a \diagup b) \diagup c$	Cancellation	if $a \diagup b = a \diagup c$ then $b=a$
	$a \times (b \times c) = (a \times b) \times c$		if $axb=axc$ then $b=c$ where $a=0$
Identity element	$0 \diagup a = a \diagup 0 = a$		
	$1 \times a = a \times 1 = a$		
Inverses	$a \diagup (-a) = 0$		
	$a \times \frac{1}{a} = 1$ where $a = 0$		

20. Pupils show ability to synthesize by interpreting given sets to form the union. (Examples from Algebra and Geometry.)

24. Pupils will show comprehension of problem solving for complex numbers and polynomical functions by identifying solution sets for given numbers and functions.

26. Pupils will show ability in analysis by naming solution sets for systems of simultaneous quadratic equations.

28. Pupils display analysis abilities by identifying solutions for factoring monomials, binomials, polynomials, and prime factors for given problems.

30. Pupils indicate comprehension of problem solving techniques by stating a rule indicating the formula for given number patterns, relations between quantities, open sentences and functions.

32. Pupils indicate application and analysis by constructing a logical proof from a given theorem.

EPILOGUE

Mathematics at this level should introduce pupils to algebraic techniques of problem solving serving as a bridge to extend arithmetic problem solving abilities as well as enabling pupils to lay a firm foundation for future study in mathematics and science.

Objectives for the end of the Twelfth Level

2. Example given on instruction sheet.

4. The pupil can indicate analysis by organizing data with graphs and tables identifying measures of central tendency and variance.

6. Pupils will indicate ability to apply the principles of probability by interpreting possible outcome of given situations.

8. Pupils will indicate application of his knowledge of logical connectives such as "and," "if-then," "if-and-only-if," to distinguish and to construct simple deductive arguments.

10. Pupils will indicate comprehension of functions and graphs by constructing graphs to display functional relations. (algebrais, trigonometric, logarithmic)

12. Pupils will indicate knowledge of functional notation by describing solutions to given problems in functional notation. (algebraic, trigonometric, logarithmic)

14. Pupils will indicate comprehension of the fundamental operations of algebra by demonstrating ability to solve computational problems with fractions and decimals.

16. Pupils will indicate comprehension of structural properties of the structural properties of the several number systems by identifying the property for given examples like:

Commutativity $a / b = b / a$ $a \times (b / c) = (a \times b) / (a \times c)$

$a \times b = b \times a$ Distributive property of addition over multiplication

Associativity $a / (b / c) = (a / b) / c$ Cancellation if $a/b = a/c$

$a \times (b \times c) = (a \times b) \times c$ then $b = a$

if $a \times b = a \times c$
then $b = c$
where $a = 0$

Identity element $0 / a = a / 0 = a$
$1 \times a = a \times 1 = a$

Inverses $a / (-a) = 0$
$a \times 1/a = 1$
where $a = 0$

18. Pupils show ability to synthesize by interpreting given sets to form the union. (Examples from algebra and geometry)

20. Pupils show ability to analyze by interpreting given sets to form the intersection of given sets. (Examples from geometry and algebra.) Pupils will show comprehension of problem solving for complex numbers and polynomial functions by identifying solution sets for given numbers and functions.

22. Pupils will show ability in analysis by naming solution sets for systems of simultaneous equations.

24. Pupils display analysis abilities by identifying solutions for factoring monomials, binomials, polynomials, and prime factors for given problems.

26. Pupils indicate comprehension of problem solving techniques by stating a rule indicating the formula for given number patterns, relations between quantities, open sentences and functions.

28. Pupils indicate application and analysis by constructing a logical proof from a given theorem.

MUSIC

Objectives for the end of the Third Level

2. Example given on instruction sheet.

GENERAL OBJECTIVE I

By the end of the third year pupils should be able to sing or play a musical selection, theme or figure.

Rationale: It is assumed that the pupil will already have had some background in musical experiences in and out of school, and a fairly wide exposure to a variety of songs. This objective seeks to explore the amount and medium of performance and the willingness to participate, either formal or informal. It is important to encourage participation and work toward quality of the performance.

SPECIFIC OBJECTIVES *

* A. The pupils should be able to sing in unison with others, alone and in parts as demonstrated by:

4. Singing familiar songs alone or in unison.

6. Singing on pitch within a limited range.

8. Singing scale and chord-line patterns.

10. Revealing sensitivity to expressive values of loud-soft singing.

12. Exhibiting increasing awareness of multiple sounds and singing chants, rounds, descants and ostinatos.

* B. The pupils should be able to play a familiar piece on a rhythm or melodic instrument as shown by:

14. Playing a rhythm instrument of his own choice in a group.

16. Playing a short familiar piece on an instrument of his choice, individually.

18. Creating rhythm accompaniments for songs.

20. Maintaining a rhythmic pattern independently.

22. Demonstrating an awareness of beat, meter, and even-uneven rhythmic patterns.

24. Demonstrating accent grouping in different meters.

* C. Pupils should be able to devise or create tunes, harmonies, variations, and utilize various music media as demonstrated by:

26. Composing simple tunes and being able to repeat them.

28. Composing a simple tune in a given rhythm.

30. Improvising vocally or instrumentally.

32. Developing simple ostinatos to familiar melodies.

34. Creating accompaniments, harmonic and rhythmic, for pentatonic melodies.

36. Creating melodies using the pentatonic scale.

38. Identifying, aurally, the major and minor modes.

GENERAL OBJECTIVE II

By the end of the third year pupils should listen to music perceptively.

Rationale: This is considered a most important objective at all ages. Many persons enjoy music who do not participate in its performance. Good listening habits which will result in enjoyment should be developed It is assumed that musical literacy comes with acquaintance and recognition. The following sub-objectives specify the musical content for which students ought to be able to listen.

SPECIFIC OBJECTIVES *

* A. Pupils should be able to perceive the various elements of music, such as timbre, rhythm, melody, harmony and texture as demonstrated by:

40. Identifying recorded timbre by instrumental types (i.e., struck, blown, bowed; strings, brass, woodwinds).

42. Listening, remembering, and repeating recorded rhythmic patterns.

44. Distinguishing duple and triple meter.

46. Listening, remembering, and singing back individual melodic phrases.

48. Distinguishing between melodies moving by steps and skips.

* B. The pupils should be able to recognize and identify musical instruments by sight and sound, musical forms and particular works by sound as demonstrated by:

50. Recognizing simple forms, as repetition of a figure, of the melody of a harmonic piece.

52. Identifying instruments with broad tonal differences.

54. Recognizing and identifying a few standard songs and pieces.

56. Identifying small dance forms, (i.e., waltz, minuet).

58. Being familiar with music based on stories, legends and fairy tales.

* C. The pupils should be able to perceive the unity of musical selections and identify gross and subtle changes in musical performance as demonstrated by:

60. Perceiving a simple tune by repeating it, either by singing, humming, or playing.

62. Recognizing a tune played in different registers and rhythms.

64. Recognizing a tune played in different timbres.

* D. The pupils should differentiate between related aspects of music by sound by being able to.

66. Distinguish the following, aurally:

voice, adult male or female;

pitch, high or low;

direction, up or down;

volume, louder or softer;

melody, steps or skips or repeated notes;

meter, even or uneven;

tempo, faster or slower;

duration, long or short;

singing, unison or harmony.

GENERAL OBJECTIVE III

By the end of the third year, pupils should be able to comprehend standard musical notation and its written and verbal symbols.

Rationale: In the general education of all students, certain musical skills and understanding should be developed. Comprehension of basic rudiments will make music more meaningful to the student.

SPECIFIC OBJECTIVES

* A. Pupils should be cognizant of the elements of notation as demonstrated by:

68. Recognizing and identifying in context the following symbols: staff; eighth, quarter, half, whole notes and corresponding rests; bar lines (Measures); loud and soft signs; treble clef sign.

70. Clapping simple rhythmic patterns within measures utilizing various meters.

72. Identifying names of lines and spaces in treble clef.

B. Pupils should be able to discriminate among similar elements of notation as demonstrated by:

74. Distinguishing the following:

eighth, quarter, half, whole notes;

three-four, four-four, and five-four meter;

skips and steps between individual notes;

melodic direction (visually) up and down; high and low; and

slur, tie, phrase markings.

C. Pupils should be able to follow the notational patterns, scores, etc. as demonstrated by:

76. Following the curvature of notation on the treble clef as to upward and downward pitch, as to beats in a measure, and as to length of a piece.

78. Following words in a song as related to notation on treble clef.

80. Identifying, visually, like and unlike phrases in notation.

GENERAL OBJECTIVE IV

By the end of the third year pupils should be increasingly knowledgeable about musical terms, composers, performers, works, periods, styles, and the place of music in the variety of heritages in our cultures.

Rationale: Students today need to discover that the arts serve a basic need of man, and music is an integral part of the arts. Through understanding the historical and contemporary environment of music, he can integrate the relationships between music and other areas of human endeavor.

SPECIFIC OBJECTIVES *

A. Pupils should comprehend common musical terms for instruments, forms, methods of performance, and other musical phenomena as demonstrated by:

Response card 2

2. Identifying a variety of instruments, visually, and their means of producing sound.

4. Identifying the names and types of standard songs and musical compositions.

6. Identifying common musical terms (duet, solo, hymn, round)

* B. 8. Pupils should be able to recognize standard pieces of music as demonstrated by identifying title and composers of selections reproduced through sound equipment in the classroom.

* C. 10. Pupils should be aware of prominent composers, performers, and other musical personalities, by name and accomplishments.

* D. Pupils should be able to relate music to man's historical development as demonstrated by:

12. An awareness of music's close connection with the numerous social activities of man at different periods in history.

14. Comprehension of what men were like in earlier times by listening to or playing and singing music from various historical periods.

GENERAL OBJECTIVE V

By the end of the third year pupils should participate in many varied musical experiences, both active and passive.

Rationale: While earlier objectives were concerned with what the person has learned to do and can do, this objective is concerned with what he does do in his daily living. It is not expected that everyone will engage in all of these activities.

SPECIFIC OBJECTIVES

* A. Pupils should participate in school - community - church musical organizations as evidenced by:

16. Performing and participating in formal and informal activities by choice.

18. Taking private vocal, instrumental or keyboard lessons.

* B. Pupils should attend functions involving music and listen to or view musical programs at home as shown by:

20. Attending musical events on the state, local and school level.

22. Listening to recorded music.

24. Watching television programs involving music.

GENERAL OBJECTIVE VI

By the end of the third year pupils should be able to discriminate and make judgements about music and its performance.

Rationale: This objective of music refers to the personal, aesthetic nature of the musical experience and suggests that such subjective experiences are not amenable to assessment. This supports the premise that the musical experience cannot be measured.

There are distinct feelings about music which cannot be ignored if the rest of the assessment in music is to make sense. Attitudes toward music and preferences will certainly influence the amount and purposes of performing, listening, and inquiry. A person may not be able to describe his aesthetic response adequately but he can note the elements contained within an objective musical situation.

Specifically pupils should:

26. Develop individual taste for music and performance.

28. Develop personal values concerning the worth of music.

30. Value music as a means of self-expression.

MUSIC

Objectives for the end of the Sixth Level

2. Example given on instruction sheet.

GENERAL OBJECTIVE I

By the end of the sixth year pupils should be able to sing or play a musical selection, theme or figure.

Rationale: It is assumed that the student will already have had some background in musical experiences in and out of school, and a fairly wide exposure to a variety of songs. This objective seeks to explore the amount and medium or performance and the willingness to participate, either formal or informal. It is important to encourage participation and work toward quality of the performance.

SPECIFIC OBJECTIVES*

* A. The pupils should be able to sing in unison with others, alone and in parts as evidenced by:

4. Singing or humming a major scale, unaccompanied.

6. Exhibiting his understanding of harmonic relationships by singing two and three-part music and polyphonic compositions.

8. Singing familiar songs alone, unaccompanied or in unison with others, giving attention to relationship between text and manner in which it is sung.

10. Experimenting with various timbre possible with voices.

12. Demonstrating experiences in augmentation and diminution as durational variants.

14. Explaining characteristic rhythm patterns of regions and nationalities.

16. Explaining characteristic metric groupings and rhythms of different dance forms.

* B. The pupils should be able to play a familiar piece on a rhythm or melodic instrument as shown by:

18. Exhibiting skill in use of autoharp, bells, and melodic instruments.

20. Using instruments to play or imitating complex rhythms and rhythm patterns in syncopation, triple and duple meter.

22. Playing a familiar piece on a band, orchestral or keyboard instrument.

24. Constructing polyphonic rhythms in planning an accompaniment.

26. Maintaining complex rhythm patterns independently on melody and percussion instruments.

* C. Pupils should be able to devise or create tunes, harmonies, variations, and utilize various music media as demonstrated by:

28. Identifying, aurally, chord changes.

30. Composing simple vocal and instrumental compositions.

32. Making up a second part for a song and notating it.

34. Composing a tune to a given rhythm.

36. Developing harmonies of two or three pitches, utilizing piano, guitar, organ, accordian, autoharp, etc.

38. Creating variations on a familiar melody (i.e. America).

40. Experimenting with dissonance, consonance and modulation.

42. Comprehending the pentatonic, whole tone and twelve tone scale.

GENERAL OBJECTIVE II

By the end of the sixth year pupils should listen to music perceptively.

Rationale This is considered a most important objective at all ages. Many persons enjoy music who do not participate in its performance. Good listening habits which will result in enjoyment should be developed. It is assumed that musical literacy comes with acquaintance and recognition. The following sub-objectives specify the musical content for which students ought to be able to listen.

SPECIFIC OBJECTIVES *

* A. Specifically, pupils should be able to perceive the various elements of music, such as timbre, rhythm, melody, harmony and texture as demonstrated by:

44. Identifying number of independent polyphonic parts.

46. Comparing two performances of the same selection for changes in melody, rhythm, and harmony.

* B. The pupils should be able to recognize and identify musical instrumentals by sight and sound, musical forms and particular works by sound as demonstrated by:

48. Identifying instruments, as to families or choirs.

50. Recognizing and identifying compositions by title, form, composer, culture.

52. Recognizing structures of two and three-part song forms and simple rondo form.

* C. The pupils should be able to perceive the unity of musical selections and identify gross and subtle changes in musical performance as demonstrated by:

54. Following two parts aurally and note how they relate.

56. Perceiving shift of voice, instrument, rhythm and pitch, in a musical context.

* D. The pupils should differentiate between related aspects of music by sound by being able to:

58. Differentiate between various rhythmic patterns.

60. Discriminate variations on a theme (student is given an example first)

62. Discriminate among instruments in the same classification.

GENERAL OBJECTIVE III

By the end of the sixth year, pupils should be able to comprehend standard musical notation and its written and verbal symbols.

Rationale: In the general education of all students, certain musical skills and understanding should be developed. Comprehension of basic rudiments will make music more meaningful to the student.

SPECIFIC OBJECTIVES

* A. Pupils should be cognizant of the elements of notation as demonstrated by:

64. Recognizing treble and bass clefs together, sixteenth notes, triplets; [illegible] signs, sharps and flats, tempo markings and other musical symbols.

66. Recognizing more complex rhythms utilizing combinations of various meters.

68. Recognizing familiar tunes from reading a score.

* B. Pupils should be able to discriminate among similar elements of notation as demonstrated by:

70. Distinguishing between the following elements:

bass and treble clefs;

quarter and eighth rests;

eighth and sixteenth notes;

half and whole rests;

sharp, flat and natural signs; and

dynamic levels on the score (f--loud; p--soft)

* C. Pupils should be able to follow the notational patterns, scores, etc. as demonstrated by:

72. Following the curvature of notation on both clefs in relation to skips and to whole and half-tone steps.

74. Following a simple piece by reading the notation as piece is played.

76. Following double staff score.

78. Interpreting meter signatures.

GENERAL OBJECTIVES IV

By the end of the sixth year pupils should be increasingly knowledgeable about musical terms, composers, performers, works, periods, styles. and the place of music in the variety of heritages in our cultures.

Rationale: Students today need to discover that the arts serve a basic need of man, and music is an integral part of the arts. Through understanding the historical and contemporary environment of music, he can integrate the relationships between music and other areas of human endeavor.

SPECIFIC OBJECTIVES *

* A. Pupils should comprehend common musical terms for instruments, forms, methods of performance, and other musical phenomena as demonstrated by:

Response card 2

2. Identifying a variety of instruments and relate something of their historical development.

4. Defining terms such as chorus, canon, trio, oratorio, quartet, medley.

6. Identifying the names of prominent composers and their major musical contributions, (orchestral or choral; solo or ensemble; opera or program, symphony).

8. Identifying the human voice classification, both female and male.

* B. 10. Pupils should be able to recognize standard pieces of music as demonstrated by identifying title and composers of selections reproduced through sound equipment in the classroom.

* C. 12. Pupils should be aware of prominent composers, performers, and other musical personalities, by name and accomplishments.

* D. Pupils should be able to relate music to man's historical development as demonstrated by:

14. Developing an understanding of the place and use of music in society at a certain time in history and of how music provides another insight into the spirit of the period.

16. Comparing the unique characteristics of the folk music of various countries.

GENERAL OBJECTIVE V

By the end of the sixth year pupils should participate in many varied musical experiences, both active and passive.

Rationale: While earlier objectives were concerned with what the person has learned to do and can do, this objective is concerned with what he does do in his daily living. It is not expected that everyone will engage in all of these activities.

SPECIFIC OBJECTIVES

* A. Pupils should participate in school - community - church musical organizations as evidenced by:

18. Performing and participating in formal and informal activities by choice.

20. Taking private, vocal, instrumental or keyboard lessons.

* B. Pupils should attend functions involving music and listen to or view musical programs at home as shown by

22. Attending musical events on the state, local and school level.

24. Listening to recorded music.

26. Watching television programs involving music.

* C. Pupils should develop a library of books, records, and acquire music and instruments for personal use as evidenced by:

28. Number and types of recordings owned.

30. Types of books about music owned.

32. Musical instruments owned for personal use.

34. Popular magazines read about musical personalities.

36. Relating involvement of music to mass media. Is it

-concentrated listening or viewing?

-background music?

-emotional response?

GENERAL OBJECTIVE VI

By the end of the sixth year pupils should be able to discriminate and make judgements about music and its performance.

Rationale: This objective of music refers to the personal, aesthetic nature of the musical experience and suggests that such subjective experiences are not amenable to assessment. This supports the premise that the musical experience cannot be measured.

There are distinct feelings about music which cannot be ignored if the rest of the assessment in music is to make sense. Attitudes toward music and preferences will certainly influence the amount and purposes of performing, listening, and inquiry. A person may not be able to describe his aesthetic response adequately but he can note the elements contained within an objective musical situation.

Specifically pupils should:

38. Develop individual taste for music and performance.

40. Develop personal values concerning the worth of music.

42. Values music as a means of self-expression.

Objectives for the end of the Ninth Level

2. Example given in instructions.

GENERAL OBJECTIVE I

By the end of the ninth year pupils should be able to sing or play a musical selection, theme or figure.

Rationale: It is assumed that the student will already have had some background in musical experiences in and out of school, and a fairly wide exposure to a variety of songs. This objective seeks to explore the amount and medium of performance and the willingness to participate, either formal or informal. It is important to encourage participation and work toward quality of the performance.

SPECIFIC OBJECTIVES *

* A. The pupils should be able to sing in unison with others, alone and in parts as evidenced by

4. Singing a part (other than the melody) of a familiar song, in a group.

6. Singing or humming a major, minor, pentatonic or chromatic scale.

8. Singing a separate part in a three or four-part round, canon.

* B. The pupils should be able to play a familiar piece on a rhythm or melodic instrument as shown by

10. Enjoying extended experiences with polyrhythms including canonic limitations.

12. Playing compound meters, irregular meters and multi-meters as used in Contemporary music as well as Renaissance.

* C. Pupils should be able to devise or create tunes, harmonies, variations, and utilize various music media as demonstrated by

14. Explaining how chords are organized and their relationship to a tonal center.

16. Inventing harmonies by creating chords of three or more pitches.

18. Creating a variation on a familiar melody, including adequate simulation of the melody or its themes and altering the melody in prescribed ways.

20. Creating a line of harmonizing tones to match a given melody or match several instruments already playing.

22. Improvising an accompaniment to a given tune (here the student applies his chording ability to the task of "completing" a piece by creating a harmonic structure).

GENERAL OBJECTIVE II

By the end of the ninth year pupils should listen to music perceptively.

Rationale: This is considered a most important objective at all ages. Many persons enjoy music who do not participate in its performance. Good listening habits which will result in enjoyment should be developed. It is assumed that musical literacy comes with acquaintance and recognition. The following sub-objectives specify the musical content for which students ought to be able to listen.

SPECIFIC OBJECTIVES *

* A. Pupils should be able to perceive the various elements of music, such as timbre, rhythm, melody, harmony and texture as demonstrated by:

24. Identifying types of texture.

26. Comprehending contemporary treatment of tone color and frequent register changes.

* B. The pupils should be able to recognize and identify musical instruments by sight and sound, musical forms and particular works by sound as demonstrated by:

28. Recognizing more complex forms of repetition, fugues, sonata, symphony, madrigal, cantata, oratorio, opera, jazz.

30. Distinguishing between form IN music and forms OF music.

32. Recognizing identical and contrasting phrases in folk and art songs, aurally and visually.

34. Identifying musical forms which are (a) homophonic and, (b) polyphonic texture.

* C. The pupils should be able to perceive the unity of musical selections, identify gross and subtle changes in musical performance as demonstrated by:

36. Perceiving repetitions of a figure, melody or harmonic piece, as in a sequence where the same tonal relationships are obtained but at different pitch levels.

38. Perceiving, aurally, the unifying factor of a round, a piece incorporating an ostinato or a repeated rhythmic pattern.

* D. The pupils should differentiate between related aspects of music by, by being able to:

40. Comprehend the fundamental principles of acoustics.

42. Explain the principles of high fidelity and stereophonic sound.

GENERAL OBJECTIVE III

By the end of the ninth year, pupils should be able to comprehend standard musical notation and its written and verbal symbols.

Rationale: In the general education of all students, certain musical skills and understanding should be developed. Comprehension of basic rudiments will make music more meaningful to the student.

SPECIFIC OBJECTIVES *

* A. Pupils should be cognizant of the elements of notation as demonstrated by:

44. Identifying key signatures, major foreign musical terms.

46. Recognizing a major scale on bass and treble clef.

48. Identifying names of lines and spaces in bass clef.

50. Recognizing, aurally and visually, intervals.

* B. Pupils should be able to discriminate among similar elements of notation as demonstrated by:

52. Identifying major and minor key signatures.

54. Distinguishing whole tone from half tone steps in treble and bass clef.

5[illegible]. In a familiar [illegible] harmonized with I, IV, V, indicating the points of change and identifying the appropriate chords to be used.

* C. Pupils should be able to follow the notational patterns, scores, etc. as demonstrated by:

5[illegible]. Following whole and half steps as indicated by sharps and flats, and as related to key signatures.

60. Following dynamic markings and directions given in English, Italian and symbols, ([illegible]).

62. Following three and four line scores.

GENERAL OBJECTIVE IV

By the end of the ninth year pupils should be increasingly knowledgeable about musical terms, composers, performers, works, periods, styles, and the place of music in the variety of heritages in our culture.

Rationale: [illegible] the arts serve a basic need of man [illegible]. Through understanding the historical [illegible] of music, he can integrate the relationships [illegible] music and other areas of human endeavor.

SPECIFIC OBJECTIVES *

* A. Pupils should comprehend common musical terms for instruments, forms, methods of performance, and other musical phenomena as demonstrated by:

64. Defining additional terms such as counterpoint, dissonance, resolution, resonance.

66. Distinguishing features of various forms (symphony, sonata, madrigal, hymn, opera, oratorio, musical, fugue).

68. Identifying the names of performers of current national prominence and their primary media through rock.

* B. 70. Pupils should be able to recognize standard pieces of music as demonstrated by identifying title and composers of selections reproduced through sound equipment in the classroom.

* C. 72. Pupils should be aware of prominent composers, performers, and other musical personalities, by name and accomplishments.

* D. Pupils should be able to relate music to man's historical development as demonstrated by:

74. Relating musical compositions studies to political or intellectual movements of the time (i.e. Beethoven and the French Revolution).

76. Relating the development of opera, oratorio, cantata, suite, concerto, and sonata to the "spirit of the age" of the 17th century.

78. Studying the development of music in religion.

80. Making a list of distinguishing characteristics for identification of the Medieval, Renaissance, Baroque, Classical, Romantic, Impressionistic, and Contemporary periods of music history.

Response card 2

2. Listening and creating electronic music.

4. Analyzing music's effect on one's varied emotional state or senses of well-being.

6. Developing an awareness of society's influence on taste.

8. Discussing the removal of man's creative and aesthetic characteristics and the implications for the future.

GENERAL OBJECTIVE V

By the end of the ninth year pupils should participate in many varied musical experiences, both active and passive.

Rationale: While earlier objectives were concerned with what the person has learned to do and can do, this objective is concerned with what he does do in his daily living. It is not expected that everyone will engage in all of these activities.

SPECIFIC OBJECTIVES

* A. Pupils should participate in school - community - church musical organizations as evidenced by:

10. Performing and participating in formal and informal activities by choice.

12. Taking private, vocal, instrumental or keyboard lessons.

* B. Pupils should attend functions involving music and listen to or view musical programs at home as shown by:

14. Attending musical events on the state, local and school level.

16. Listening to recorded music.

18. Watching television programs involving music.

* C. Parents should develop a library of books, records, and acquire music and instruments for personal use as evidenced by the:

20. Number and types of recordings owned.

22. Types of books about music owned.

24. Musical instruments owned for personal use.

26. Popular magazines read about musical personalities.

28. Relating involvement of music to mass media. Is it:

-concentrated listening or viewing?

-background music?

-emotional response?

GENERAL OBJECTIVE VI

By the end of the ninth year pupils should be able to discriminate and make judgements about music and its performance.

Rationale: This objective of music refers to the personal, aesthetic nature of the musical experience and suggests that such subjective experiences are not amenable to assessment. This supports the premise that the musical experience cannot be measured.

There are distinct feelings about music which cannot be ignored if the rest of the assessment in music is to make sense. Attitudes toward music and preferences will certainly influence the amount and purposes of performing, listening, and inquiry. A person may not be able to describe his aesthetic response adequately but he can note the elements contained within an objective musical situation.

Specifically pupils should:

30. Develop individual taste for music and performance.

32. Develop personal values concerning the worth of music.

34. Develop personal preferences within the realm of music based on wide exposure.

36. Value music as a means of self-expression.

PHYSICAL EDUCATION

Objectives for the end of the Third Level

2. Example given in instructions.

4. The pupil will demonstrate his knowledge of the rules of games he has been taught as measured by a set of multiple choice questions which will have four alternatives.

6. The pupil will demonstrate a positive attitude toward safety as measured by his response to four alternative choices.

8. The child will apply the rules of safety on the playground as measured by a checklist containing (1) statements of the rules of safety and (2) two categories which can be used to indicate whether or not pupils apply each one of the rules.

10. Given specific instruction in games, relays, and rhythms, the pupil will respond by demonstrating specific skills in the activities as compared to oral instructions provided.

12. The pupil will demonstrate self-control by controlling his temper when a rule is misunderstood or a game is lost as measured by the teacher's observation.

14. The pupil will demonstrate leadership and fellowship by his response to these roles when simulated and observed by the teacher.

16. The pupil will identify individual capacities and skills by responding to a wide range of activities listed in a paper and pencil test.

18. The pupil will demonstrate respect for property by assisting the teacher in preparing equipment and supplies for class and reporting needed adjustments and repairs.

20. The pupil will demonstrate his peer acceptance and respect by his ability to socialize effectively as measured by a sociometric measuring device administered by the teacher.

22. The pupil will demonstrate his appreciation of sports as a spectator by his response to a multiple choice test of attitudes based on a film or video taped presentation.

24. The pupil will demonstrate his knowledge of running, jumping, hopping and leaping by his ability (score) as measured by the Aahper knowledge test of these basic skills.

PHYSICAL EDUCATION

Objectives for the end of the Sixth Level

PHYSICAL FITNESS

2. Example given in instructions.

4. The pupil (boy) will demonstrate his strength to pull up his weight, hanging from a horizontal bar for the maximum number of times as measured by the AAHPER norms for his age group. Girls demonstrate flexed 90^{0} arm hang for duration of maximum time.

6. The pupil will demonstrate his or her strength to sit-up from a supine position the maximum number of times as measured by the AAHPER norms for his age group.

8. The pupil will demonstrate his energy by alternate running and walking for a distance of 600 yards in the fastest possible time as measured by the AAHPER norms for his age group.

10. The pupil will demonstrate his or her leg power by broad jumping from a standing position to the maximum distance as measured by AAHPER norms for his age group.

12. The pupil will demonstrate his or her arm strength in throwing a softball from behind a restraining line to the maximum distance as measured by the AAHPER norms for his age group.

14. The pupil will demonstrate his or her energy in performing the shuttle-run, carrying two 2" x 2" x 4" blocks of wood 30 feet across the starting line in two separate runs at the fastest possible time as measured by AAHPER norms for his age.

16. The pupil will demonstrate his or her energy by running 50 yards in a direction which represents his or her fastest possible time as measured by AAHPER norms for his age.

Skills

18. The pupil will demonstrate skill proficiency in volleying, serving, passing and setting up a volley ball at norms computed for his or her sex and age as measured by the AAHPER volleyball skills test.

20. The pupil will demonstrate skill proficiency in softball throw for distance, overhead throw for accuracy, underhand pitch, speed throw, fungo hitting, base running, fielding ground balls, and catching fly balls at norms computed for his or her sex and age as measured by the AAHPER softball skills test.

22. The pupil will demonstrate skill proficiency in the front shot, sideshot, foul shot, underbasket shot, speed pass, jump and reach, overarm pass for accuracy, push pass for accuracy and dribble at norms computed for his or her sex and age as measured by the AAHPER basketball skills test.

24. The pupil (boys only) will demonstrate skill proficiency in the forward pass for distance, 50 yard dash with football, blocking, forward pass for accuracy, football punt for distance, ball changing zig-zag run, catching forward pass, pull-out, kickoff, and dodging run at norms computed for his age as measured by the AAHPER football skills test.

26. The pupil will demonstrate his ability to perform a series of tumbling stunts in progression including the head stand, hand stand, front roll, back roll, round off, cart wheel, head spring, hand spring and front flip as measured on a ten point scale, judged by the teacher.

28. The pupil will demonstrate his rhythmic ability by performing the basic movements of skipping, galloping, and sliding and also he will demonstrate his ability to synchronize with a group in folk, square, and creative dances as measured by the teacher's pass or fail ratings.

Knowledge

30. The pupil demonstrates his knowledge of throwing, striking, kicking and catching by his ability (score) as measured by the AAHPER Knowledge test of these basic skills.

PHYSICAL EDUCATION

Objectives for the end of the Ninth Level

PHYSICAL FITNESS

2. Example given in instructions.

4. The pupil (boy) will demonstrate his strength to pull up his weight, hanging from a horizontal bar for the maximum number of times as measured by the AAHPER norms for his age group. Girls demonstrate flexed 90^{0} arm hand for duration of maximum time.

6. The pupil will demonstrate his or her strength to sit-up from a supine position the maximum number of times as measured by the AAHPER norms for his age group.

8. The pupil will demonstrate his energy by alternate running and walking for a distance of 600 yards in the fastest possible time as measured by the AAHPER norms for his age group.

10. The pupil will demonstrate his or her leg power by broad jumping from a standing position to the maximum distance as measured by AAHPER norms for his age group.

12. The pupil will demonstrate his or her arm strength in throwing a softball from behind a restraining line to themaximum distance as measured by the AAHPER norms for his age group.

14. The pupil will demonstrate his or her energy in performing the shuttle-run, carrying two 2" x 2" x 4" blocks of wood 30 feet across the starting line in two separate runs at the fastest possible time as measured by AAHPER norms for his age.

16. The pupil will demonstrate his or her energy by running 50 yards in a direction which represents his or her fastest possible time as measured by AAHPER norms for his age.

SKILLS

18. The pupil will demonstrate skill proficiency in volleying, serving, passing and setting up a volley ball at norms computed for his or her sex and age as measured by the AAHPER volleyball skills test.

20. The pupil will demonstrate skill proficiency in softball throw for distance, overhead throw for accuracy, underhand pitch, speed throw, fungo hitting, base running, fielding ground balls, and catching fly balls at norms computed for his or her sex and age as measured by the AAHPER softball skills test.

22. The pupil will demonstrate skill proficiency in the front shot, side shot, foul shot, underbasket shot, speed pass, jump and reach, overarm pass for accuracy, push pass for accuracy and dribble at norms computed for his or her sex and age as measured by the AAHPER basketball skills test.

KNOWLEDGE

48. The pupil will demonstrate his knowledge of safety by completing a written test concerning protective requirements in regard to activities, contact, examinations, insurance, equipment, supplies and facilities.

50. The pupil will demonstrate his knowledge of factors which effect and modify participation by completing a multiple choice test covering the effects of age, sex, maturity, environment, skill, conditioning, fatigue, stress, alcohol, tobacco, drugs, attitude and performance aids.

52. The pupil will value his self-realization potential and cultural, aesthetic and artistic appreciation in sports by responding to a list including factors including reason, intelligence and judgmental abilities.

PHYSICAL EDUCATION

Objectives for the end of the Twelfth Level

PHYSICAL FITNESS

2. Example given in instructions.

4. The pupil (boy) will demonstrate his strength to pull up his weight, hanging from a horizontal bar for the maximum number of times as measured by the AAHPER norms for his age group. Girls demonstrate flexed 90^{0} arm hang for duration of maximum time.

6. The pupil will demonstrate his or her strength to sit-up from a supine position the maximum number of times as measured by the AAHPER norms for his age group.

8. The pupil will demonstrate his energy by alternate running and walking for a distance of 600 yards in the fastest possible time as measured by the AAHPER norms for his age group.

10. The pupil will demonstrate his or her leg power by broad jumping from a standing position to the maximum distance as measured by AAHPER norms for his age group.

12. The pupil will demonstrate his or her arm strength in throwing a softball from behind a restraining line to the maximum distance as measured by the AAHPER norms for his age group.

14. The pupil will demonstrate his or her energy in performing the shuttle-run, carrying two 2" x 2" x 4" blocks of wood 30 feet across the starting line in two separate runs at the fastest possible time as measured by AAHPER norms for his age.

16. The pupil will demonstrate his or her energy by running 50 yards in a direction which represents his or her fastest possible time as measured by AAHPER norms for his age.

SKILLS

18. The pupil will demonstrate skill proficiency in volleying, serving, passing and setting up a volley ball at norms computed for his or her sex and age as measured by the AAHPER volleyball skills test.

20. The pupil will demonstrate skill proficiency in softball throw for distance, overhead throw for accuracy, underhand pitch, speed throw, fungo hitting, base running, fielding ground balls, and catching fly balls at norms computed for his or her sex and age as measured by the AAHPER softball skills test.

22. The pupil will demonstrate skill proficiency in the front shot, side shot, foul shot, underbasket shot, speed pass, jump and reach, overarm pass for accuracy, push pass for accuracy and dribble at norms computed for his or her sex and age as measured by the AAHPER basketball skills test.

24. The pupil (boys only) will demonstrate skill proficiency in the forward pass for distance, 50 yard dash with football, blocking, forward pass for accuracy, football punt for distance, ball changing zig-zag run, catching forward pass, pull-out, kickoff, and dodging run at norms computed for his age as measured by the AAHPER football skills test.

26. The pupil will demonstrate his ability to perform a series of tumbling stunts in progression including the head stand, hand stand, front roll, back roll, round off, cart wheel, head spring, hand spring and front flip as measured on a ten point scale, judged by the teacher.

28. The pupil will demonstrate his rhythmic ability by performing the basic movements of skipping, galloping, and sliding and also he will demonstrate his ability to synchronize with a group in folk, square, and creative dances as measured by the teacher's pass or fail ratings.

30. The pupil will demonstrate skill proficiency in shooting 12 arrows, 10, 20 30 yards (boys) at 10, 20 yards (girls) for total distances at norms computed for sex and age as measured by the AAHPER Archery skills test.

32. The pupil will demonstrate skill proficiency in tennis with the overhand serve, the forehand volley, the backhand volley, the overhead smash and half-volley as measured by the teachers 10 point scale rating.

34. The pupil will demonstrate skill proficiency in golf by putting, pitching, driving, and fundamentals of backswing, downswing, followthrough, stance, grip and body alignment as measured by the teacher's 10 point rating scale.

36. The pupil will demonstrate skill proficiency in bowling with the stance, the 4-step approach, the delivery and follow'through fundamentals as measured by the teacher's 10 point rating scale.

38. The pupil will demonstrate skill proficiency in badminton with the serve, the forehand and backhand volley, the overhead smash and half-volley as measured by the teacher's 10 point rating scale.

40. The pupil will demonstrate skill proficiency in beginning gymnastics by performing prescribed routines in free exercise, on the low and high horizontal bars, parallel bars, back and spring-board, side horse, long horse, still and flying rings and trampoline (girls will use the uneven parallel bars and add the balance beam routine) as measured by the teacher's rating on a 10 point scale.

42. The pupil will demonstrate his skill proficiency in track and field by performance measurements in the high jump, broadjump, shot put, discus and 75 yard low hurdles.

44. The boy (only) will demonstrate his skill proficiency in wrestling by executing a take-down, escape, reverse, and pinning hold as measured by the teacher's pass-fail rating.

46. The boy (only) will demonstrate his skill proficiency in weight training by executing a clean, jerk and snatch as measured by the teacher's pass-fail rating.

KNOWLEDGE

48. The student will demonstrate his knowledge of rules and strategies by responding to a list of multiple choice questions covering these areas.

50. The student will demonstrate his knowledge of the immediate and long range effects of activity in regard to fatigue, health, weight control, strength, endurance, posture and relaxation by completing a true-false test covering this body of knowledge.

52. The student will express his attitude by his conduct in respect to officiating, sportsmanship, teamwork and cooperation as observed and recorded by the teacher on a 10 point rating scale.

SCIENCE

Objectives for the end of the Kindergarten Level

2. Example given on instruction sheet.

4. The pupils should be able to name common objects, living and non-living, and distinguish among them with regard to color, size, shape, weight, texture, smell, and taste to indicate his knowledge of these classifications.

6. The pupil will indicate an ability to apply his understanding of the senses by describing the taste, smell, etc., of a common object.

8. The pupil indicates a comprehension of the consequences of different forms of energy by interpreting the consequences of exposure of common objects to heat, cold, magnetism, etc.

10. The pupil indicates his knowledge of the properties of objects by distinguishing among common objects with regard to their possible uses.

12. The pupil indicates an analysis of daily weather by describing the conditions (rain, snow, wind, etc.) presented in diagrams.

14. The pupil indicates his knowledge of temperature by ordering gross differences in temperature, e.g. an ice cube, a ball, a bowl of soup.

16. The pupil indicates a comprehension of distance by distinguishing among objects which are presented at various distances from the pupil.

18. The pupil indicates a knowledge of direction by distinguishing between above--below, and right--left, relations when such differences are presented.

20. The pupil indicates a comprehension of size by ordering common objects which have gross size differences.

22. The pupil indicates comprehension of lighting by distinguishing between drawings which represent light--dark differences.

24. The student analyzes his environment by naming and describing the gross aspects of the sky, air, water, soil, the earth, and the sun.

26. The pupil indicates his knowledge of time intervals by distinguishing among the intervals of the calendar, of the seasons, and of the clock.

28. Pupil indicates knowledge of numerals by naming and ordering the [illegible].

SCIENCE

Objectives for the end of the Third Level

2. Example given on instruction sheet.

4. The pupil demonstrates his comprehension of arbitrary measuring scales by identifying his own unit to measure a table.

6. The pupil identifies his comprehension of measurement scales which include positive and negative, e.g. uses negative numbers to describe temperature colder than melting ice on centegrade scale.

8. The learner describes his analysis of observing and inferring, e.g. describes the difference between an inference and observation when the inference contains incomplete data.

10. The pupil evaluates an inference by interpreting its consequences, e.g. interprets what weather condition might be present to produce a wet tricycle when a sprinkling system is also present.

12. The pupil applys his ability to predict by describing the outcome of an untried but parallel experiment, e.g. orders several cans of different volume in terms of candle burning time in the sealed jars.

14. Pupils show ability in analysis and synthesis by demonstrating grouping, separating and regrouping sets of objects by given classification schemes.

16. Pupils indicate comprehension of measurement concerning quantities of large and small sizes and great and small distances by naming large and small numbers that approximate the size or distance ratios.

18. Pupils indicate comprehension of numerical data treatment by describing information in tabular and graphical form. These displays would include line graphs, circle graphs and bar graphs to indicate relationships between variables.

20. Pupils show comprehension of rate of change with time by describing changes over periods of time and identifying the rate of change.

22. The pupil indicates ability in evaluation by interpreting that observed position and motion differ relative to the location of the observer.

24. The pupil indicates ability in evaluation by interpreting that observed position and motion are relative to the motion of the observer.

SCIENCE

Objectives for the end of the Sixth Level

2. Example given on instruction sheet.

4. Pupils indicate comprehension by describing an operational definition for mass, volume, density, and force. (e.g. describes that density is mass per unit volume.)

6. Pupils indicate application of space/time relations by interpreting the relations. (e.g. Vector-speed problem is graphically displayed.)

8. The pupil shows ability in analysis of an experiment with similar materials by constructing a classification key for testing the materials. (e.g. similar materials and chemical change.)

10. Pupils show comprehension of using numbers by describing large and small numbers in scientific notation (e.g. $64{,}000 = 6.4 \times 10^4$).

12. Pupils show application of using numbers by identifying ratios and constructing scale drawings. (e.g. indirect measurement of heights of trees and buildings.)

14. Pupils show application of measurement by demonstrating the use of a single scale to measure a complex quantity. (e.g. measure pressure to describe force per unit area.)

16. Pupils indicate application of their comprehension of the interaction between living things by constructing systems. (e.g. pupils construct a food chain.)

18. Pupils show comprehension of the conservation of mass, volume, energy, and momentum by applying the rules. (e.g. potential energy, Kinetic energy for falling bodies is described by the pupil.)

20. Pupils indicate ability in synthesis by constructing a table to identify characteristics. (e.g. the first generation of offsprings for given genetic traits are described.)

APPENDIX D

PERFORMANCE OF POPULATION GROUPS

Performance of Pupil Population Groups

Pupil population groups were identified by each student completing a form attached to each test booklet. Pupil responses to the test items were compared among population groups to locate areas of specific needs among various populations.

Results of such comparisons can be used (1) to examine the testing instruments in terms of cultural bias, and (2) to state educational needs in specific enough terms to guide remediation. These comparisons are summarized in Table 5 and are described in narrative form on the following pages.

Kindergarten:

Low socio-economic status (SES) children tended to score lower on the mathematics items than middle or high SES children. No other differences between groups were found significant.

Third Grade:

The music questions did not discriminate between groups. The mathematics items showed ethnic group differences. Children who came from bilingual homes found math and music items more difficult than children for whom English was the only language in the home.

On the physical education items, children in Title I and III schools scored lower than other children. Groups identified on the basis of ethnicity found these items difficult.

Title I and B groups students tended to rank lower than other children on the language arts item pool. American Indian, Negro, and Oriental students tended to rank lower than other children on language arts.

Negro and Spanish-surnamed American students tended to score lower than other children, as did low SES children on the health items.

Sixth Grade:

Only urban and low SES children tended to rank low on the physical education items at this level.

Math proved relatively more difficult for students from schools with Title III programs and for students from schools with both Title I and III programs. Also, students in suburban and rural schools indicated difficulty with math items.

The science test tended to be more difficult for students from Title III schools and students from schools with both Title I and III programs. American Indian and Negro students similarly experienced difficulty.

Girls and most ethnic groups (AI, N, SA) experienced difficulty with health questions at this grade level.

Music proved relatively more difficult for Title I, III, and both Title I and III groups than other children. Rural school children tended to rank lower than other children on this subject as did Spanish-surnamed students, low SES students and bilingual students.

Ninth Grade:

No group was distinguished from the total group on the health test at this grade level.

On the math test, Title I and B group children tended to rank lower than other children in that classification. Negroes and Spanish-surnamed Americans found this subject difficult as did children who come from homes where a second language is spoken.

Boys scored higher than girls on the P. E. items.

Language arts was relatively more difficult for AI, N, O, and SA ethnic groups than for "Others." A second language spoken in the home was also a characteristic of low performance.

Rural school children and boys tended to rank low on music in the 9th grade. Bilingualism was also characteristic of students with poor performance in music.

Twelfth Grade:

As at the 9th grade level, no significant group differences on the health test are apparent.

Girls did not perform as well as boys on the physical education items.

The math questions resulted in lower rankings for Title I and both Title I and III children than for other children. Suburban and rural children also experienced difficulty on this measure, as did Negro and Spanish-surnamed American students. Low SES and second language spoken in the home were more characteristic of the lower performing students in math at this grade level.

Language arts was relatively more difficult for children in schools under both Title I and III than for other children. Low SES children, suburban children, and children in all minority ethnic groups tended to rank low on this subject.

The music questions discriminated in all classifications except sex. Title I and III groups did poorly as did suburban and rural school children. Low SES was characteristic of poor performance.

Students from homes that spoke a second language experienced difficulty with this subject as did Negro and Spanish-surnamed Americans.

Table 5

Description by Classification Groups of the Composition of the Lowest 20% Performance Group by Test Within Grade Level*

		Title				Urbanism			Sex		Ethnic Group					2nd Lang.		SES		
		I	III	2	N	U	S	R	M	F	AI	N	O	SA	OTHER	YES	NO	L	M	H
Kindergarten	Math																	x		
	Science																			
Third Grade	Math										x	x		x		x				
	Phys. Ed.		x	x							x	x	x	x						
	Lang. Arts	x		x							x	x	x							
	Science															x		x		
	Health		x	x								x		x				x		
	Music																			
Fourth Grade	CSM Verbal		x	x								x		x				x		
	CSM Occ.	x	x	x							x	x		x				x		
Sixth Grade	Math		x	x			x	x												
	Phys. Ed.					x												x		
	Lang. Arts								x		x	x	x	x		x		x		
	Science		x	x							x	x								
	Health								x		x	x		x						
	Music	x	x	x				x						x		x				
Ninth Grade	Math	x		x								x		x		x				
	Phys. Ed.									x										
	Lang. Arts										x	x	x	x		x				
	Health																			
	Music							x	x							x				
Eleventh Grade	CSM Verbal	x		x								x		x						
	CSM Occ.	x		x	x					x	x	x		x		x				
Twelfth Grade	Math	x		x			x	x				x		x		x				
	Phys. Ed.									x										
	Lang. Arts			x			x				x	x	x	x				x		
	Health																			
	Music	x	x				x	x				x		x		x		x		

*An "x" indicates that the category has a disproportionately large number of pupils in the lowest fifth of the performance range (significant at the .05 level).

Elementary School Pupil Characteristic Items

Name of Student: _____

School: _____

Name of Teacher: _____

Date: _____

Time of Day: _____

To the proctor: Please answer the following questions with the aid of the student and/or school personnel. The aid of school personnel in answering item number four may be especially needed. Pupil's records should be checked to verify his responses.

1. What is this pupil's sex?

   ( ) Male ( ) Female

2. Indicate below if this pupil is a member of any of the following racial or national origin groups?

   ( ) American Indian
   ( ) Negro
   ( ) Oriental
   ( ) Spanish-surnamed American (Persons of Cuban, Mexican, or Puerto Rican descent)
   ( ) None of those listed

3. Is a language, other than English, regularly spoken in the pupil's home?

   ( ) Yes ( ) No

4. In the box below, please write the usual occupation of the person who is the primary supporter of this pupil's family. If you don't know, write "Don't Know" in the box below.

   Please indicate below the most appropriate option describing the occupation you have written in the box above.

   ( ) Farm worker
   ( ) Farm manager or owner
   ( ) Unskilled worker, laborer, or domestic worker
   ( ) Semi-skilled worker
   ( ) Skilled worker
   ( ) Sales agents and representatives
   ( ) Technical
   ( ) Manager or foreman
   ( ) Official
   ( ) Professional
   ( ) Don't know

APPENDIX E

NEEDS ASSESSMENT

NEEDS ASSESSMENT

The concept of needs assessment was built on the definition of "educational need" as "the discrepancy between a goal and its achievement." Related elements of the concept are shown graphically in the model following. Shown in the model are variables of educational outcomes, student performance behaviors, and curricular programs. Needs can be hypothesized in relation to these variables.

Hypotheses of Educational Needs

Use of the above-mentioned model to generate hypotheses of educational need can be demonstrated using data collected in the Spring testing. On the dimension labeled "Basic Educational Outcomes" consider area #13, "Cognizance of Occupational Opportunities."

For example, it was found in the testing that low socio-economic pupils lacked occupational cognizance. Looking at the model, the need can be pinpointed as follows:

1. Basic Education Outcome #13
   Cognizance of occupational opportunities
2. Student Behavior
   Cognitive
3. Program Variable
   Vocational education, industrial arts, home economics, others

Relating these three variables suggests several hypotheses concerning a demonstrated need:

1. Would occupational cognizance be increased through increased enrollment in occupational classes?

2. Would more emphasis or cognitive aspects in occupational programs increase occupational cognizance among specific pupil population groups?

3. Are other program variables involved: could, for example, pupils gain occupational cognizance in their social studies programs?

These and other hypotheses or hypothetical questions can be drawn from the model on the page following.

Testing the Hypotheses

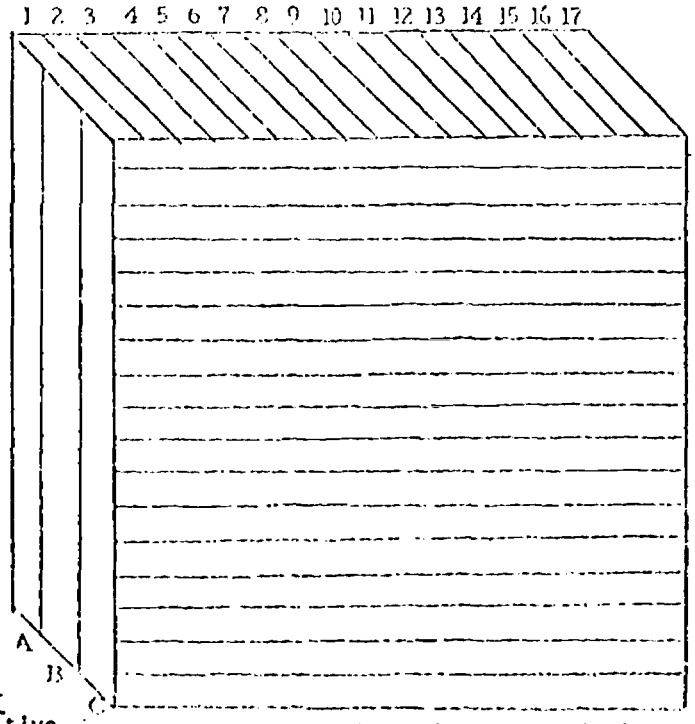
The only real way to test the above or other hypotheses would be to set up a systematic program of assessment, resource allocation and re-assessment for the

desired outcome. The state and local districts together may identify needs through assessment to guide allocation of resources on a rational basis. The following model for needs assessment may be used for such allocations.

OVERVIEW OF VARIABLES

Basic Educational Outcomes:

1. Knowledge of Science information, skills, concepts.
2. Knowledge of Mathematics information, skills, concepts.
3. Knowledge of Social Studies information, skills, concepts.
4. Ability to read rapidly with comprehension.
5. Ability to communicate in writing.
6. Ability to spell correctly.
7. Knowledge and appreciation of Music.
8. Ability to draw and to appreciate Art.
9. Knowledge of Health skills and concepts.
10. Physical proficiency.
11. Proficiency in and knowledge of Home Economics.
12. Proficiency in and knowledge of one or more Industrial Arts.
13. Cognizance of occupational opportunities.
14. Interest in school, school subjects, and education.
15. Value of self, family, society.
16. Ability and initiative to solve real and pressing problems.
17. Ability and desire to participate in group work.



Program:

Science
Math
Social Studies
Reading
Eng. Comp., Grammar
Spelling
Music
Art
Health, Safety, Recreation
Physical Education
Home Economics
Voc. Ed./Industrial Arts
Foreign Languages
Guidance
Health
Psychological
Other

Student Behavior

A. Cognitive
B. Affective
C. Psychomotor

In the Context of Pupil Characteristics:

Age/Sex/Race or Ethnic Origin/ Second language when in home/ Occupation of head of household