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An analysis of the first grade books of five basal reading series for science content

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Introduction

The purpose of this study was to analyze five basal first grade reading systems for material which might be used in developing science concepts.

As reading is usually taught through a basal reading system, it would seem that if material is included in the text which is pertinent to science concepts, it would be profitable to use it in teaching science as well as the reading skills.

The child of today lives in an age of science. Before him lies the whole world to explore and appreciate. His school, in providing for his all-around growth, attempts to give him an understanding of the scientific generalizations which he finds in his own environment. Many of these will come directly from the regular course of study in science. Some, however, will be found in the material he uses while learning the mechanics of reading. Thus, the interrelationships of man's existence and the part of science in an everyday world become evident to the very young learner. As Clyde Fisher puts it:

An isolated fact is not science. Science begins when one fact is compared with another; that is, when a fact is

1. Fisher, Clyde; Gerould, John; Poodle, James; Timm, John; Quirke, Terence; Wissler, Clark; The Marvels and Mysteries of Science. Wm. H. Wise & Co., Inc., New York, 1941, p. VII.
considered in relation to other facts. Science is knowledge correctly classified with respect to interrelated facts. The building blocks of science are the phenomena of nature, and a phenomenon is anything observed to occur. Science depends upon straight thinking. Logic is not a science, although it is an indispensable preparation for the scientific approach. Mathematics is hardly a science, but rather an indispensable tool in pursuit of scientific truth.
CHAPTER I

SUMMARY OF PREVIOUS RESEARCH

Science is a part of each individual's existence. Applications of man's scientific skills are apparent to all. Daily use of some of these skills have become so common as to be almost automatic. Even the very young child accepts unquestionably newly developed machines, methods, and materials in his every day world. In spite of all this, the elementary school is just beginning to include a science program in its curriculum.

The development and all around growth of the child is the aim of primary teaching. In a modern world this must include the scientific method of thinking which promotes the ability to observe accurately, to generalize correctly and check data found. Basic understandings come through this approach to problems.

To keep a scientific attitude in relation to his environment the young child must learn good social behavior. He must be taught to form habits of seeking, rejecting superstition, the laws of cause and effect, respect for opinions, and willingness to accept stronger proof than his own.

A well formed science course seeks to further the child's understandings rather than to have him amass his knowledge of a series of accumulated facts.
Craig lists the following as his six basic principles of science instruction:

1. The universe is very large.
2. The earth is very old.
3. Changes occur continuously in the universe.
4. The adaptation of life to the environment.
5. Interdependence of living things.
6. Variation of living and non-living things.

The field of science in the elementary school is new and now widens the scope of a subject which was formerly restricted to nature study. Since the area is not well established at the elementary level, research is less abundant here than at the Junior and Senior High levels. However, the place of science in the elementary school cannot be overlooked. John Dewey states:

Hence the rightful place of science in education is a fundamental one, and it is correspondingly important to see to it that methods of teaching are such as to fulfill its true purpose.

When we pass from this generality, it seems to me that the first need is to discriminate certain stages in the educational development of science. The first stage belongs of necessity to the elementary school, for I do not think that any amount of pains and ability in the high school can make up for a wrong start or even a failure to get the right start in the grades.


2. Dewey, John, "Method in Science Teaching" Science Education, April, 1945, 29: p. 120.
Educators are beginning to realize the need for an early start in science education. This could be done through the introduction of scientific concepts as they appear in the environment.

According to F. S. Hammett:

"...Science teaching should pay more attention to the interdependencies. The almost hermetically sealed walls that separate subject from subject should be broken through. And there should be a shift from subject compartmentalization to intersubject integration."

Croxton notes that the early years in education are ideal ones for laying the foundation for true scientific attitudes:

It is not too early to begin the development of scientific attitudes and habits of procedure. Young children have a seemingly insatiable curiosity. This is one of the most essential scientific attitudes. Instead of stifling it, we must cultivate it. The child's interest possesses a freshness undulled by adult custom, coercion, and the substitution of much reading and reciting for direct experiencing.

We have come to consider the first few years of the child's life the most important formative period. It is possible that we may discover that they are likewise most important in establishing scientific attitudes.

Schools today are trying to teach children how to live democratically in a world rebuilt by science. This involves

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new courses of study and more integration of school subjects.

J. D. Bernal surveys the situation so:

If science is to take the central part in a new educational system, it must be a science that relates far more closely than in the past to the material and social aspects of ordinary life, and it must be linked throughout with the other parts of teaching...

In the new view, training in science is required for two purposes:

The first objective is to provide enough understanding of the place of science in society to enable the great majority that will not be actively engaged in scientific pursuits to collaborate intelligently with those who are, and to be able to criticize or appreciate the effect of science on society.

The second objective, which is not entirely distinct, is to give a practical understanding of scientific method, sufficient to be applicable to the problems which the citizen has to face in his individual and social life.

The integrated school program is a decided aid toward all-around pupil growth when used even in primary school education. W. C. Croxton:

The tendency in planning curriculums is distinctly toward integration especially in the earlier school years. This is a natural consequence of the shift in emphasis from the subject matter to the developing child. The experiences of childhood are not to be sectioned according to arbitrary fields designed for more intensive acquaintance with single aspects of knowledge. Partition of the day into brief periods devoted to specific learnings in the separate subjects is not in accord with the growing concept of education. It probably tends to disorganize the growing child's personality rather than to integrate it. It furthermore tends to place emphasis on unrelated learnings rather than attainment of self-direction in natural units of experience.

2. Croxton, W. C., op. cit., p. 72.
When scientific concepts are presented as children observe, broad generalizations are gradually built up. Craig makes this point in saying:

As the child matures, he can weave in more relationships and build up new concepts. Water and its relation to living things may be seen as an important element in determining habitats and in understanding geography.

Thus we see simple learning elements added to simple learning elements to form new concepts, which in turn are added to others. In this way the maturing child grows toward the understanding of the basic principles of science which explain a wide range of the phenomena of living and non-living things. Such principles of science as space, time, interrelationships and variation may become in turn fundamental to the development of attitudes on social problems.

Good social behavior is necessary to the growth of a democracy. Science points the way in a modern democracy and its educational beginning should be in the first school years. Craig gives the statement that:

The basic purpose of teaching science is to contribute to the development of desirable social behavior. Science with its dynamic aspects, its insistence upon critical-mindedness and better understanding of the world, and its demand for intelligent planning has a contribution to make to the content and methods of education.

Croxton reiterates the thought:

Another of the major aims of science teaching is to enable the individual to meet the problems of existence with

2. Ibid., p. 34
the available scientific knowledge. Certain of these matters of direct utility concern the elementary school child. He needs certain habits and knowledge for preserving his health. He must be trained in various practices to insure his safety. As he comes to perform various acts, he should have the knowledge and experience to enable him to do so effectively, as, for example, in growing plants, caring for a pet, and constructing the objects he needs. He also needs to be able to use certain devices effectively. As early as the kindergarten or first grade, children have need to be able to give their names and addresses and to tell time and direction.

Again from W. C. Croxton:

Broad concepts are the outcomes of wide knowledge and experience and hence, are matters of slow growth. For this reason, and because of the difficulty of comprehension, they cannot be fully grasped in the elementary grades. Many experiences contributing to the ultimate comprehension of broad concepts are, however, an important part of science work at this level. Broad concepts should be important unifying factors in education. The teacher of science in the elementary grades is contributing to the eventual concept outcomes some of their basic building materials in the form of experiences, facts, and principles.

Natural phenomena is observed by young children and a functional understanding of scientific principles can be taught early. Young children will attempt to explain the wonders which they see on every side and in the books which are presented to them.

Oakes analyzed the explanations children make for many kinds of natural phenomena. He used experiments and oral questions and compared results with those given in the same manner to adults. The experimenter was attempting to find


out which ideas were used most be children in these explanations of phenomena. The following conclusions were reached:

1. Although a few responses are enigmatic, the great majority are matter-of-fact, physical, in other words, naturalistic.

2. No evidence is found to corroborate Piaget's interpretation that there is a definite stage in the child's thinking which is characteristic of a given age.

3. There was a more marked tendency on the part of adults than of children to hold views once stated in the face of the testimony of their senses when the experiment was performed. Nevertheless, whatever differences there are between the reactions of the children and the adults seem largely, if not entirely, quantitative rather than qualitative.

In a controlled study of children in the first six grades Haupt found that the teaching of scientific generalizations is practical. He attempted to get interpretative reactions from children when he presented scientific situations.

His findings were:

1. Children generalized on all six of the grade levels studied.

2. The generalizations which were made on the lower grade levels were less complex than those made on the higher grade levels but the children generalized in terms of their experience.

3. The difference between the mental operations of children of the first and sixth grades was not one of

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3. Ibid., p. 100
ability to generalize but was one concerning the complexity of generalizations.

In the elementary school there is a need for developing a program of broad science generalizations. Croxton cites:

The satisfaction of the child's immediate desires growing out of interests in his environment has always been uppermost in the nature study idea. Less consideration has been given to direction of effort toward comprehension of scientific concepts.

Since we live in a world of science, the primary teacher looks for evidence of scientific thinking in children's interests. Craig points out that activities may grow out of more than one subject matter field:

It is apparent that science is rich with content which can contribute to the development of desirable social attitudes and behavior through the solution of challenging problems. The child can gain those understandings of the world about him which help him to adjust intelligently because he has a constructive, realistic, and objective outlook upon life. It is important that the curriculum of the school provide the child with the experiences which furnish him with a continuity of learning about aspects of the entire environment. In the solution of problems, the activities may utilize material from more than one subject matter field.

Again from M. Meister:

While correct understanding is not always a guarantee of desired conduct, one cannot deny that it is a sine qua non of intelligent behavior in a democracy. Thus education for

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all becomes, in an important sense, science education for all. The concepts of common learnings and cultural heritage must be redefined to conform with an evolving social climate in which science content and scientific outlook give basic meaning to human activity.

The integrated program has been found successful in most elementary schools of today. Science plays a large part in this because exploration of natural phenomena of the environment pertaining to an activity unit interests the child. However, not all science can be taught incidentally. A well organized science program should serve as a guiding force in teaching concepts and principles of science as a correlated subject. In this way many basic facts can be acquired while learning a tool subject such as reading.

W. C. Croxton

The elementary school is no longer to be regarded merely as a place where we perfect the tools for obtaining an education at a later period. This point of view of the elementary school has been based, in part, on the erroneous assumption that children cannot reason until they are more mature and in part, on a too limited conception of education. The apparently more acceptable view that children are limited in their reasoning primarily by lack of basic experiences rather than lack of the general ability to reason has revolutionary implications for the elementary school. It implies that a great function of the elementary school is to provide foundational contacts and experiences. It suggests that reading should be an aid in establishing wider contacts and in enriching their meaning; that the program should be built around direct experiences, not around reading.

What are the fields of contact and experience to which we should begin to introduce the child even long before he

learns to read, and to which he will continue to devote his attention throughout life? They are the fields of (1) social contacts and relationships and (2) contacts and relationships with objects and natural forces. The former is the province of the social studies. Elementary science is the most fertile subject for exploration of the latter field in the lower grades. It is one of the great areas of elementary education.

The elementary school teaches much of its science by providing experiences which give understanding and meaning to problems found in the environment. G. S. Craig states:

A realization of the immensity of the universe and an understanding of the interrelationships of living things are so fundamental in character that they may be thought of as basic conceptions, since they assist in interpreting a wide range of phenomena and in solving many problems. A recognition of these basic principles on the part of the teacher and in the printed material available for the children tends to give to learning a social value which is not present if content items are taught as more or less isolated or as related only to the problems under consideration. So as the attention of teachers and children is focused upon the solution of problems, content is found to be essential; the content itself can serve the child in his growth toward the acceptance and utilization of the basic principles of science in his own life experiences.

Evidence would seem to indicate that for primary classes, broad areas of interest pertaining to science best fit into an integrated program. These lead to understandings and generalizations rather than to quantities of unrelated factual information. The newer science courses of study include:

Animal life; plant life; weather; machines; man's increasing control over nature.

The modern elementary school attempts to direct the learning process toward more intelligent living through understanding of ideas. Science holds an essential part in this program.
CHAPTER II

PLAN OF THE STUDY

The purpose of the study was to analyze basal reading books for material around science concepts. It was necessary to determine what place science has in Grade I. The teaching of science has become a growing area and is already established as a part of many elementary school programs. Gerald S. Craig in writing of the importance of every member of a democracy having an understanding of the place of science in society says:

Science is a powerful tool which can be used for good or for evil. If democracy is to survive, the common people must become aware of the potentialities of modern science in a world community. To produce this awareness seems to be uniquely a task for the elementary school, since the elementary school is the school of the people. The teacher, then, will need to make certain that science is made to function in the thinking of all the children. In this way the elementary school teacher becomes an important factor in the destiny of our nation and the world.

Recognizing the aptness of the above observation, the author of this study wished to analyze basal first grade reading books for material which might be used in developing science concepts at the primary level. Five basal reading systems were selected for the analysis. Determinent factors in the selection of the books were their gross sales and widespread

current use. The systems included were:


A. Reading Readiness Book: On Our Way
B. First Pre-Primer: Come And Ride
C. Second Pre-Primer: This Is Fun
D. Primer: Tags And Twinkle
E. First Reader: Good Times On Our Street


A. Reading-Readiness Book: Before We Read


B. First Pre-Primer: We Look and See
C. Second Pre-Primer: We Work and Play
D. Third Pre-Primer: We Come and Go


E. Primer: Fun With Dick and Jane
F. First Reader: Our New Friends

A. Pre-Primer: Everyday Doings
B. Little Primer: Who Knows
C. Primer: Reading For Fun
D. First Reader: Finding Friends


A. Pre-Primer Level One: Mac and Muff
B. Pre-Primer Level Two: The Twins, Tom and Don
C. Pre-Primer Level Three: Going to School
D. Primer Level One: At Play
E. Primer Level Two: Fun In Story
F. First Reader Level One: I Know A Secret
G. First Reader Level Two: Good Stories


A. Pre-Primer: Laidlaw Pre-Primer
B. Primer: On The Way To Storyland
C. First Reader: Making Storybook Friends

The Thirty-First Yearbook of the National Society for the Study of Education:

Science is more than just a body of knowledge; it has developed concepts the effects of which are not limited to the field of science itself. Some concepts because of their direct relations to human interest and human welfare have modified thinking in many fields. Many of these concepts, when understood, greatly modify the thought reactions of the individual.

Certain objectives that are selected for elementary science should conform to those conceptions (1) that greatly influence the thinking of the individuals who learn their meaning, and (2) that have modified thinking in many fields of science.

To present simple scientific concepts in the primary unit which will prepare the child for an understanding of larger concepts later, is one of the aims suggested by The National Society for the Study of Education. The Thirty-First Yearbook lists the following basic concepts to be presented, some of which must be modified for the elementary school:

1. The earth is very old as measured in terms of our units of time.
2. The surface of the earth has not always had its present appearance and is constantly changing.
3. Space is vast.
4. The earth has been developed as a result of the action of natural forces.
5. The sun is the original source of energy for the earth.
6. The earth's position and relation to the sun and moon are of great importance to the life of the earth.
7. All life has evolved from very simple forms.
8. Species have survived because by adaptations and adjustments they have tended to become better fitted to the conditions under which they live.
9. The physical environment has great influence, not only upon the instructional forms of life, but also upon society.
10. Man has modified plant and animal forms through a knowledge of methods found in nature.

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1. Ibid., pp. 135-141.
11. Through interdependence of species and struggle for existence there tends to be maintained a balance among many forms of life.

12. Chemical and physical changes are manifestations of energy.

Specific content for Grade One:

A. Change of seasons.
B. An effect of cold weather
C. Using a thermometer
D. The air about us
E. Where plants and animals live
F. Plants and seeds
G. Sun, moon, and stars

Early curriculum courses of study considered nature study to be basic science material for primary grades. This idea has gradually been supplanted, so that, today, true scientific concepts are being introduced as they appear in the child's experience.

According to Lee:

Elementary science has in the past been taught merely to satisfy curiosity such as the former nature study courses, or to yield certain scientific information. Then followed organized courses in science. Important concepts in science became organizing factors of courses of study with the publication and acceptance of the point of view advocated in the Thirty-First Yearbook of the National Society for the Study of Education.

Increasingly apparent is the improvement in practice of relating concepts to social consequences and utilizing experiences of children as a means of contributing to their conceptual development.

1. Ibid., pp. 180-181.

The modern viewpoint toward organization of science courses indicates the desirability of developing, in the early school years, understandings of basic scientific principles. It is during the primary years that interest in scientific thinking should be aroused. The Massachusetts State Department of Education\(^1\) in a recent publication, emphasizes the importance of science:

The elementary school years are a time for laying a firm foundation for the beginning of the "fund of knowledge". It is a period of exploration, for the children should have experiences in many branches of science but a detailed study of none. The elementary school years are a time for opening the child's eyes, arousing his curiosity about many things and orienting him to the whole great field of science.

The following areas are suggested for Grade I in planning a program of science concepts to be developed:\(^2\)

A. Outdoor excursions  
B. We visit a farm  
C. Caring for pets  
D. Our circus or zoo  
E. We keep weather records  
F. We take care of our bodies and watch them grow  
G. We watch changes in the sky

Books have been published in recent years which provide science material for the primary level. New science text books

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2. Ibid., p. 142.
by Craig and Burke suitable for use in the first grade present
the following content:

**Science All About Us**

1. The Seasons
2. Animals
3. Plants
4. Things That Are Not Alive
5. Weather
6. The Magnet
7. What Makes Things Go
8. An Easy Way
9. Water
10. Homes

**We Find Out**

1. All Around Us
   - Things That Live
   - Things That Do Not Live
2. Animal Homes
   - Animal Homes At School
   - Animal Homes In and Out of Doors
3. Air
4. What Makes Things Go
5. Heat and Cold
6. Working with Machines and Magnets
7. The Garden

Many reading clues are present in the picture material
which is part of the modern books beginners use. The printed
word is not the sole means a child has for obtaining infor-
mation.

1. Craig, Gerald S., and Burke, Agnes, *Science All About
   Us*, Ginn and Company, Boston, 1946, p. 3.

2. Craig, Gerald S., and Burke, Agnes, *We Find Out*, Ginn
   and Company, Boston, 1940, pp. 3, 4.
Beauchamp recommends a picture method for primary science which, under teacher-guidance, develops science concepts and science thinking skills. In his book for Grade One he places the material around the following centers of interest:

1. Animals
2. Machines
3. Days and Days (Weather)
4. Outdoors (Plants)

In some of the newer courses of study this material appears. The Nashville City Schools outline for Grade One includes:

1. To observe that the appearance of the landscape changes with the seasons.
2. To learn how trees prepare for winter; to identify at least three common trees.
3. To learn how some plants store food for the new plant.
4. To become acquainted with the common flowers, both wild and cultivated.
5. To discover that seeds and cuttings make new plants of the same kind and that seeds have different ways of being scattered.
6. To learn how some animals prepare for winter.
7. To become familiar with a few common animals and insects.
8. To realize that weather affects us in different ways.
9. To learn some of the different forms of moisture.
10. To observe the effect of seasons on animal and plant life.
11. To develop the proper attitude toward cleanliness.


12. To develop self-control with regard to time of eating, kinds of food selected, and amount of food eaten.
13. To develop proper clothing practices.
14. To develop proper attitudes toward fresh air and sunshine.
15. To develop the proper attitudes toward safety.

New York schools use a course of study which limits the first grade science teaching as follows:

1. Plants and animals live almost everywhere on earth.
2. Our earth is made up of air and water and land.
3. Air surrounds us.
4. The sun, moon and stars are in the sky.
5. Plants and animals are active in spring.
6. We get our food from plants and animals.

In a course of study for elementary science, Mikesell organized first grade material around four centers:

1. Living things
2. Autumn
3. Winter
4. Spring

The first grade science outline used in Michigan schools follows:

1. Interest in observing weather conditions.
2. Interest in seasonal changes in the immediate environment.
3. Interest in where and how insects and animals live during the different seasons.

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4. Interest in nature of machinery that helps man to do his work.

The Forty-Sixth Yearbook\(^1\) of the National Society for the Study of Education Part I, presents as its theme "Science Education in American Schools" and notes the feasibility of teaching science with other subjects:

Whatever the plan of program organization used in the elementary school, the science in the curriculum should have a close relationship to the other phases of the school program. Regardless of whether the program is organized in terms of an integrated curriculum, it is important in solving problems to use content from any field which is needed.

Again The Forty-Sixth Yearbook\(^2\) states:

It is important that the material selected for each grade of the primary school be balanced to include the elements of learning which represent a rich experience with science. Each level should give the child some opportunity for exploration with content derived from the five great major fields of science: astronomy, biology, chemistry, geology, and physics. This cannot be accomplished by studying only plants and animals.

A wide scope of science material which can be adapted to any grade level is listed in the Forty-Sixth Yearbook\(^3\) as indicated thus:

By the end of each year the children should have experienced some growth in the broader areas of the physical and biological environment, such as the following:

1. The universe

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2. Ibid., p. 84.

3. Ibid., pp. 75-76.
2. The earth
3. Conditions necessary to life
4. Living things
5. Physical and chemical phenomena
6. Man's attempt to control his environment

On the basis of the foregoing research, five areas were selected for the classification of science concepts which might be found in first grade reading books. They are as follows:

1. Animal life
2. Plant life
3. Weather
4. Machinery
5. Natural forces

All of the books in the five basal reading systems were then analyzed page by page for science material in these areas. It was decided to use Beauchamp's index to science concepts for Grade I as a check list for the analysis, since it included material in four of the five areas designated above. Beauchamp's areas entitled Animals, Machines, Days and Days, and Outdoors, correspond to the areas called for the purpose of this study, Animal Life, Machinery, Weather, and Plant Life. The index follows:

**Animals**
There are many kinds of animals

Animals have definite physical characteristics by which one can be distinguished from another. They may differ in color and marking. They may differ in general shape and size of body. They may differ in body covering. Most baby animals are more like their parents than like other animals and grow to resemble their parents.

Animals live in various environments.
Some animals live on land.
Some animals live in water.
Some animals live on land and can fly.
Some animals live on both land and water.

Animals carry on activities to keep alive.
Animals can move about.
Some animals can walk, hop, or run.
Some animals can crawl.
Some animals can swim.
Some animals can fly.
Some animals can use two or more methods of locomotion.

Most animals find or build homes.
Most birds make nests.
Some animals make colony homes.
Some animals use shelters they find available.
Man must provide shelter for domesticated animals.

Animals must have food to live and grow.
Animals follow a definite life pattern.
Wild animals find food in the environment.
Animals that are domesticated by man must be fed by him.

Man uses animals for various purposes.
Some animals provide pleasant companionship.
Some animals provide man and animals with food.
Some animals provide man with materials for clothing.
Some animals assist man in his work.
Some wild animals are confined in order to provide opportunities to observe and study them.

Machines

A machine is any implement or device that aids in doing work.
Some machines help us to do work with a minimum expenditure of muscular energy.
Some machines help us to do work rapidly.
Engine-run machines have greater power than man or animal-run machines.
Engine-run machines can move heavier loads.
Engine-run machines can do work more quickly.
Engine-run machines can do more work in a given period of time.
Machines are valuable only in so far as they are intelligently chosen and manipulated to solve a problem.

Electricity is a source of power.
It provides light in our homes.
It provides energy to run machines.
It provides energy to operate systems of communications.
It provides an efficient source of power.
Electrical devices are turned on and off.
Electricity is ready for instant use.

Days And Days
There are many kinds of weather.
Sun, rain, and wind are elements of weather.
Weather combinations vary.
Weather changes often.
There are usually definite indications of weather changes, and we are often able to predict weather changes on the basis of these.

Seasons have characteristic weather conditions.
The seasons are: summer, autumn, winter, spring.
Weather varies from season to season.
Weather varies within a season.
People adjust their activities and clothing to changes in weather and season.

Outdoors
There are many kinds of plants.
Most common plants that we know have roots, stems, flowers, branches, and leaves, and produce seeds.
Plants have distinguishing features by which we can tell one from another.
Flower or fruit color and size are common distinguishing features.
Size, shape, and color of leaves are common distinguishing features.
General shape and size may be distinguishing features.
Plants are different from animals, although both are alive.
Plants grow and reproduce their kind.
Many plants grow from seed.
Plants follow a definite pattern of growth.
Seeds produce the same kind of plants as the parent plants.
People and animals use plants in various ways.
Some plants are used for food and clothing.
Some plants provide man and animals with shelter.
Some plants provide aesthetic pleasure.

Previous research provided the following concepts for checking the fifth area in the study entitled Natural Forces:

Balance aids motion.
Tides ebb and flow.
Water is a moving force.
What goes up must come down.
An air-tight balloon will fly.
The five senses give man power.
Steam aids man's work.

In listing science concepts, distinction was made between picture and text material. Before We Read, page 20, presents a full page picture of a fruit and vegetable store. This gives opportunity for establishing the concept on plant life relating to distinguishing features and is listed so:

Plant life...size and color are distinguishing features. p. 20 (picture)

Fun With Dick And Jane,\(^1\) page 91, presents a concept on animal life in the text as follows:

Some animals can jump. -p. 91(text)

Jump, jump!
Up went the kitten.
Down came the ball.
Down came the kitten.

Page 76 in Fun With Dick And Jane\(^2\) gives an illustration of a science concept on weather:

Clothing varies with the season. -p. 76(picture)

Both adults and children are shown dressed for summer out of doors.

An example of science material in the area of machinery listed in Finding Friends\(^3\) is given below:

Engines can move heavy loads. -p. 38(text)

The little switch engine worked in the freight yard. Puff, puff, puff!
It pushed the freight cars here and there.

Finding Friends\(^4\) also presents one of the science concepts listed in the area of natural forces in the text on page 22:

Steam gives power to engines. -p. 22(text)

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2. Ibid., p. 76.


4. Ibid., p. 22.
"The water gets so hot that it makes steam," said Grandpa. "The steam pushes and pushes and pushes, and makes the engine go."

While the actual phrasing of the science concepts listed does not appear in the books analyzed, the concept itself is present and can be used for basic teaching.

After the books of the five basal reading series were analyzed for science concepts, tables were set up to facilitate a comparison of the amount of science material present in the various systems, as well as the amount of science material in the books within a series. Each table gives the frequency of the science concepts found in the analysis.

Finally a master sheet was made for the purpose of summarizing the data compiled in the five frequency tables. This groups the books as Readiness-Books, Pre-Primers, Primers, and First Readers and can be easily read to find the amount of science material in a specific book and area.
CHAPTER III

ANALYSIS OF DATA

The purpose of the study was to analyze the first grade books of five basal reading systems for science content. This chapter presents the material found, as follows:

Part I lists the science concepts page by page in the reading books analyzed. Tables I, II, III, IV, V, are included to show the frequency of the concepts in the five different series, according to the areas of classification chosen for the purpose of the study. They also include figures which show the number of pages, number of words introduced, number of units, number of stories, number of people and number of animals introduced in each book.

Part II gives an over-all picture of science material found in the five reading systems analyzed.

PART I

I. Today's Work-Play Books

A. Reading-Readiness Book - On Our Way

Engine-run machines help man's work - p. 9(picture)
Some animals provide companionship - p. 19(picture)
Engine-run machines travel quickly - p. 34(picture)
The picture book quoted above is used as an introduction to reading while the child learns about interesting experiences of real children who are like himself. The activities are placed around the farm, the home, travel, adventures, pets and animal life. A few pages present simple text which does not require word mastery.

B. First Pre-Primer - Come and Ride

Some animals provide companionship - p. 1(picture)
Balance aids motion - p. 16(picture)
Some animals assist man's labor - p. 38(text)

This basal Pre-Primer relates incidents in the everyday life of Jim and Judy and their pet dog, Tags. The content is in story form and interest centers are: home, pets, health, and play activities.

C. Second Pre-Primer - This is Fun

Engine-run machines can move faster than man - p. 1(picture)
Some animals can swim - p. 39(text)

This is Fun, a supplementary Pre-Primer, continues the experiences of Jim and Judy. The text widens the learning areas through stories of city life, trips to the zoo and beach.

D. Primer - Tags and Twinkle

Tools aid man's work - p. 2(picture)
Some animals provide companionship - p. 5(text)
Engine-run machines provide transportation - p. 38(text)
Machines can go above clouds - p. 51(picture)
Some animals provide food - p. 92(text)

Adventures of the characters previously introduced in the series are recounted in the Primer. The content reaches out into the community life as the children work and play at the farm and in school. Some fanciful material is included. Thus opportunity is provided for the beginner in reading to note differences between reality and fiction.

E. First Reader - Good Times on Our Street
Trees denote seasons - p. 3(picture)
Balance - p. 30(text)
Baby animals resemble their parents - p. 55(picture)
Some animals live in water - p. 64(picture)
Birds fly north in Spring - p. 111(text)
Baby birds hatch from eggs - p. 113(text)
Some animals work for man - p. 119(picture)
We change clothing with seasons - p. 131(picture)
Snow is an element of weather - p. 143(text)
Some plants provide food - p. 158(text)
Some animals provide materials - p. 180(text)
Sky indicates weather - p. 176(text)
Physical characteristics distinguish animals - p. 65(picture)
Tales of animal life, nature, community helpers, humorous adventures make interesting content in the First Reader of the series. Real life situations in which the characters work and play are revealed to the reader.
Table I

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| Number of stories in book | 9 | 15 |
| Number of people introduced | 9 | 18 |
| Number of animals introduced | 10 | 17 |

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II. Curriculum Foundation Series

A. Reading-Readiness Book - Before We Read

Dark clouds indicate rain - p. 4

Engines move heavier loads than man - p. 16

Plant life...size and color are distinguishing features - p. 20

Plant life...some plants provide food - p. 21

Illumination - p. 24

Engine-run machines travel quickly - p. 28

Baby animals resemble parents - p. 29

Baby birds hatch from eggs - p. 32

Bird feet have insulated covering - p. 35

Tides ebb and flow - p. 40

Water can be reached by digging - p. 41

Sunset - p. 45

This book contains picture material only and provides opportunity for developing the power to read a wealth of ideas pictorially. There are six centers of interest: pets, toys, work and play at home, the farm, the zoo, and a family party. These reach into other fields of the curriculum and the child acquires skill in interpreting pictures as they become part of his environment.

B. First Pre-Primer - We Look and See

Balance - p. 9(picture)

An air-tight balloon will fly - p. 20(picture)

The activities of young children at play are described
both through pictures and text in this book.

C. Second Pre-Primer - *We Work and Play*
   
   Rain comes from dark clouds - p. 12 (picture)
   What goes up must come down - p. 36 (picture)
   Machines speed labor - p. 40 (picture)
   Heavy objects will not sail alone - p. 55 (picture)
   Wind is an element of weather - p. 60 (picture)

   Familiar work and play experiences of various members of a family are revealed in this pre-primer. Their pets are considered part of the family group.

D. Third Pre-Primer - *We Come and Go*
   
   Glass protects food - p. 11 (picture)
   Machines save energy - p. 25 (picture)
   Some machines have greater power than man - p. 28 (text)
   Some animals can swim - p. 70 (text)
   
   The family's excursions provide material for this pre-primer. Story plots are introduced and the content is interestingly presented.

E. Primer - *Fun With Dick and Jane*
   
   Sense of touch - p. 11 (text)
   Some machines save labor - p. 40 (text)
   Weather changes with the season - p. 46 (picture)
   Baby animals resemble parents - p. 50 (text)
   Animals vary in color - p. 51 (picture)
   Some animals give man pleasure - p. 52 (text)
Some animals provide food for man - p. 56 (picture)
Baby chickens hatch from eggs - p. 60 (text)
Electricity cooks our food - p. 75 (picture)
Clothing varies with seasons - p. 76 (picture)
The sky foretells weather - p. 85 (text)
Some animals can jump - p. 91 (text)
Communications - p. 109 (text)
Engine-run machines help men travel - p. 135 (text)
Animals have different characteristics - p. 146 (text)

The Primer of the series contains material in story form which tells of family life at home and at the farm.

F. First Reader - Our New Friends
Some animals provide companionship - p. 11 (text)
Activities adjust to seasons - p. 14 (picture)
Weather changes p. 17 (picture)
Sun indicates clear weather p. 21 (text)
Some animals have sense of direction - p. 40 (text)
Tools aid man's work - p. 67 (text)
Some animals live on land and in water - p. 71 (picture)
Some animals have protective covering - p. 71 (text)
Some birds use man made shelter - p. 74 (text)
Animals differ in color and size - p. 82 (text)
Frost causes nuts to fall - p. 107 (picture)
Wild animals find food that is nearby - p. 111 (text)
Weather changes with seasons - p. 112 (text)
Some animals provide food - p. 119 (text)
Birds build homes - p. 121 (text)
Electricity provides power - p. 135 (picture)
Wind is an element of weather - p. 139 (text)
Down hill objects gather speed - p. 143 (text)
Baby animals grow to be like parents - p. 137 (text)

In the First Reader of the series both real and fanciful stories are presented. Thus the child learns, through reading, to develop scientific attitudes toward real life situations.
The theme centers of the book are: fun at home and school, fun with work activities, fun with animals and toys.
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III. Child Development Readers

A. Pre-Primer - Everyday Doings

People adjust clothing and games to seasons - p. 2
Plants improve through cultivation - p. 7
Some animals provide food - p. 15
Some animals live in water - p. 20

The Pre-Primer of the series is a picture book which provides for reading readiness. Some of the material relates to a central theme and some is in serial story form. There are also two dictionary pages to introduce words which are found in the next book.

B. Little Primer - Who Knows

Some plants give pleasure - p. 4 (picture)
Man must provide shelter for domestic animals - p. 42 (text)
Some animals store food for winter - p. 23 (picture)

The family and pets which children enjoy are introduced in this Little Primer. Work and play activities in the home and community are featured.

C. Primer - Reading For Fun

Some machines help man to conserve energy - p. 46 (picture)
Engines have greater power than man - p. 58 (picture)
Tools help solve a problem - p. 63 (text)
Baby animals resemble parents - p. 83 (text)
Engine-run machines travel rapidly - p. 91 (text)
Mother animals feed baby animals - p. 99 (text)
Some animals provide pleasure - p. 101 (text)
Landscape indicates season - p. 103 (picture)
Sky denotes time of day - p. 118 (picture)
Animals have different physical characteristics which identify them - p. 142 (picture)

As the Primer title indicates, fun is the theme of this book and centers around fun at home, fun at school, and fun at the farm. Community workers are introduced and the child also reads of domestic and wild animal life.

D. First Reader - Finding Friends
Steam gives power to engines - p. 22 (text)
Engines can move heavy loads - p. 38 (text)
Some animals are good companions - p. 58 (picture)
Electricity gives illumination - p. 49 (picture)
Electricity operates power for communications - p. 51 (picture)
Man must provide homes for domestic animals - p. 59 (picture)
Domestic animals must be fed by man - p. 60 (text)
Some animals eat plants - p. 75 (text)
Animals have different physical characteristics - p. 86 (text)
Sun is an element of weather - p. 103 (text)
Tools aid man's work - p. 116 (picture)
Some plants grow from seed - p. 118 (picture)
Many birds build their own homes - p. 122 (picture)
Cultivation improves plants - p. 123 (picture)

In this book the children go on excursions, learn of plants and animals, and enjoy some fanciful story material. Everyday activities in and out of school are described.
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IV. Easy Growth in Reading

A. Pre-Primer Level One - Mac and Muff
   Green leaves signify the season - p. 10 (picture)
   Some animals can swim - p. 30 (picture)

B. Pre-Primer Level Two - The Twins
   Fresh air is an aid to health - p. 3 (picture)
   Some animals provide companionship - p. 11 (text)
   Electricity gives power for communication - p. 14 (picture)
   Man must supply food to domestic animals - p. 30 (picture)
   Man must provide shelter for domestic animals - p. 31 (picture)

C. Pre-Primer Level Three - Going to School
   Some animals make good companions - p. 4 (text)

Pre-Primer Level One: Mac and Muff is the basic Pre-Primer of this series. It contains stories of real life experiences in childhood and the centers of interest are: home, the out-of-doors, pets, and excursions. The following Pre-Primers promote individual progress through expansion of the themes. Activities at school present a new interest and the story form is consistent.

D. Primer Level One - At Play
   Some animals provide companionship - p. 9 (text)
   Baby animals resemble parents - p. 32 (picture)
Man must supply food for domestic animals - p. 36 (text)

Some animals can swim - p. 37 (picture)

Snow is an element of weather - p. 95 (text)

E. Primer Level Two - Fun in Story

Animals differ in size and shape - p. 9 (picture)

Some animals can climb - p. 19 (text)

Baby chickens hatch from eggs - p. 34 (text)

Sky indicates time of day - p. 102 (picture)

Both Primers follow closely the vocabulary and experiences of the children introduced in the Pre-Primers. Repetition of the concepts presented previously, also leads the reader into new areas of wider interest. Fun and play at the farm, school experiences, and stories of animal life make interesting content at this level of learning.

F. First Reader Level One - I Know A Secret

Snow is an element of weather - p. 25 (text)

Some animals provide companionship - p. 26 (picture)

Sun is an element of weather - p. 32 (text)

Many birds travel in Spring - p. 34 (text)

Rain is an element of weather - p. 38 (text)

Most birds build nests - p. 46 (text)

Baby birds hatch from eggs - p. 47 (text)

Engine-run machines speed man's work - p. 135 (text)
In this First Reader many stories of animal life, the farmyard, and tales of nature widen the child's concepts of the world about him. The characters of the earlier books appear again and their experiences in and out of school serve an interesting content.

G. First Reader Level Two - Good Stories
   Animals differ in size and shape - p. 9 (picture)
   Rain is an element of weather - p. 43 (text)
   Some animals can swim - p. 47 (text)
   Some animals provide man's food - p. 51 (text)

First Reader Level Two is an absorption reader which follows the First Reader Level One. The interest centers around animal life, both wild and domestic, put into story form.
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| Number of pages | 48 | 31 | 31 |
| Number of words introduced | 52 | 15 | 13 |
| Number of units in book | 3 | 3 | 3 |
| Number of stories in book | 7 | 17 | 19 |
| Number of people introduced | 5 | 7 | 7 |
| Number of animals introduced | 2 | 4 | 3 |

**Table IV**

(continued)

<table>
<thead>
<tr>
<th>Title of Book:</th>
<th>Primer L/1 At Play</th>
<th>Primer L/2 Fun in Story</th>
<th>First Reader L/1 I Know A Secret</th>
<th>First Reader L/2 Good Stories</th>
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| Number of pages | 121                  | 121                  | 151                           | 121                          |
| Number of words introduced | 104                  | 63                   | 165                           | 66                           |
| Number of units in book | 7                    | 5                    | 7                             | 3                            |
| Number of stories in book | 25                   | 11                   | 35                            | 11                           |
| Number of people introduced | 9                    | 1                    | 10                            | 2                            |
| Number of animals introduced | 10                   | 10                   | 20                            | 16                           |

V. Laidlaw Basic Readers

A. Pre-Primer - Laidlaw Pre-Primer

Some plants supply food - p. 3 (picture)
Color of foliage denotes season - p. 9 (picture)
Some animals increase man's pleasure - p. 30 (text)
Man provides shelter for domestic animals - p. 46 (text)
Rain is an element of weather - p. 50 (text)
Animals differ in size and shape - p. 63 (picture)

Actual experiences of real children are related in this Pre-Primer. The child acquires concepts which parallel his own experiences.

B. Primer - On the Way to Storyland

Man changes clothing with seasons - p. 5 (picture)
Some animals make pleasant companions - p. 6 (text)
Some trees provide food - p. 11 (picture)
Landscape indicates time of year - p. 18 (picture)
Sun will dry moisture - p. 35 (text)
Some animals provide food - p. 46 (picture)
Wind is an element of weather - p. 60 (text)
Snow is an element of weather - p. 77 (text)
Some animals can protect themselves - p. 124 (text)

The Primer of this series contains stories about the children introduced in the Pre-Primer but interest is aroused through the element of surprise. One section is devoted to
familiar fairy tales. This gives opportunity for developing a scientific attitude through reading as the child learns to enjoy both imaginative and factual material.

C. First Reader - Making Storybook Friends

Some animals are pleasant companions - p. 5 (text)
Most trees lose leaves in autumn - p. 5 (text)
Baby animals resemble parents - p. 30 (text)
Some animals can swim - p. 34 (text)
Bees take honey from plants - p. 37 (text)
Some animals eat plants - p. 39 (text)
Animals differ in size and shape - p. 51 (picture)
Wind is an element of weather - p. 65 (text)
Some birds return in Spring - p. 66 (text)
Sky indicates weather - p. 67 (text)
Most birds build their own shelter - p. 68 (text)
Baby birds hatch from eggs - p. 72 (text)
Some animals provide food - p. 89 (text)
Animals have different physical characteristics - p. 99 (text)

This First Reader describes many phases of animal life. There are stories of play activities common to children and also tales of make-believe. As the child reads, he learns to distinguish between reality and fancy.
### Table V
Data on Laidlaw Basic Readers

<table>
<thead>
<tr>
<th>Title of Book:</th>
<th>Pre-Primer</th>
<th>Primer</th>
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<td>2. Ocean Life</td>
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<td>3. Land Life</td>
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<td>4. Machinery</td>
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<td>5. Natural Forces</td>
<td>35</td>
<td>36</td>
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</table>

**Hint:** Look at the table for more information.
## Table of Contents

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CHAPTER IV
SUMMARY AND CONCLUSIONS

The books which form a basal series for the teaching of reading are usually built around a group of units. This provides excellent opportunity for growth in social behavior and the ability to reason correctly. In the first grade, foundations are laid which, though basically simple, can be enlarged upon year after year and found to be parallel in truth.

The writer of this study found enough science content in the books here analyzed to warrant its use as part of a first grade science program.

Conclusions:

1. The largest number of science concepts found in the five reading systems which were analyzed, pertained to animal life. The totals were:

   Animal life...............33 concepts
   Weather...................36 concepts
   Machinery................27 concepts
   Natural forces............15 concepts
   Plant life.................11 concepts

2. The five areas for classification of science concepts in the analysis of books, showed the following results:
Curriculum Foundation Series: 21 2 13 13 8
Child Development Readers: 14 4 4 7 2
Easy Growth in Reading: 19 0 7 1 2
Laidlaw Basic Readers: 16 3 9 0 1
Today's Work-Play Books: 13 2 3 6 2

3. The Curriculum Foundation Series presented more science material than any other reading system analyzed. The total number of science concepts found in each of the series used for the purpose of this study was as follows:

Curriculum Foundation Series............57 concepts
Child Development Readers..............31 concepts
Easy Growth in Reading.................29 concepts
Laidlaw Basic Readers..................29 concepts
Today's Work-Play Books...............26 concepts

4. In the twenty-five reading books analyzed, the science concepts were found to be almost equally divided between picture and text material. The totals were:

Pictures....................84 concepts
Text.........................88 concepts
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Service Paper
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