LESSONS ON COLOR

IN

PRIMARY SCHOOLS.

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The following plan for Color-lessons, prepared for the use of teachers in the Boston Primary Schools, was reported at the request of the Massachusetts State Board of Education, and was printed in the Appendix to the Annual Report of that Board for 1882.

It is now offered, after some revision, for wider circulation, in the hope that it may prove suggestive to other teachers.

L. C.

Boston, August 25th, 1883.

LESSONS ON COLOR

IN

PRIMARY SCHOOLS.

Lessons on color should have a place in primary schools, both for the good fundamental training they give and because a knowledge of the distinctions and harmonies of color is indispensable to success in many occupations. Again, colors attract the young child, and are a source of enjoyment to the well-trained eye, whether perceived in nature or art, in decoration or in dress. Color is to the eye what music is to the ear, and children vary in quickness of color-perception as they do in natural ability to distinguish musical sounds.

Importance of teaching colors, and of educating the color-sense.

Color-blindness will be detected early, if right methods are followed in the color-lessons in primary schools; and a knowledge of this defect is important to children, that they may learn to rectify some of the mistakes that arise from it. If aware of such defect, they will scarcely need to be warned, later, against the choice of an occupation, for success in which color-perception is important.

Material.

For lessons on color, different colored material, worsteds, silks, tissue-papers, bits of ribbon, pattern cards, etc., will serve a good purpose, even where color blocks and charts are provided.* The inventive and interested teacher will have no difficulty in finding resources.

PLAN OF THE FIRST YEAR'S WORK.

To cultivate perception of color.

For the purpose of training children to distinguish and to name the common colors,—red, orange, yellow, green, blue, violet, gray, brown, white, and black.

Let the children learn,

1. To select and match, and then to name these colors. (See Note A.)

2. To distinguish *different* reds, greens, etc., and to select light and dark reds, etc.

3. To select lighter and darker than a given color. (See Note B.)

4. To match given colors *exactly*.

Training in Form in Connection with Color.

Color and form, being both perceived through the eye, are naturally associated in teaching. Lessons

* A Color-chart, with a packet of cards for the use of pupils, recently published by L. Prang & Co., Boston, and authorized for use in the Boston Primary Schools, is a trustworthy and valuable basis for these elementary lessons.

for this purpose should, however, fit into a well-arranged series of lessons on form running through the primary course.

Lead children,—(See Notes C, D, and E.)

1. To recognize and to name the square and the triangle, by presenting colored cards in these forms. **Square and triangle shown in colors.**

2. To observe the number of sides and corners in each. That the corners of the square are all alike —square corners—and the sides equal.

3. To copy simple designs made with colored squares and triangles. (See pp. 20-21.)

In General.

4. Call attention,—

To the pleasure that color gives in the sky, in flowers, birds, etc.

To the beauty of objects as dependent upon color.

To color as a help in distinguishing objects, as flags, signals, etc.

Suggestions for Lessons.

[Note A.]

To Distinguish Red.

Hold before the class a piece of red paper, worsted, or silk. Let different children pick out, from a collection of cards, worsteds, etc., things similar to it in color; and thus get the perception of red. **Perception of red.**

What is the name of this color? *Ans.* Red. (Some child in the class may know.) Always connect the name with the sensation of a color. **Name.**

Application. Each pupil find something that is red in the room.

Each think of something that is red — animal, flower, etc.

Each notice something red before the next lesson.

[The same method for the other colors. Keep up the interest by varying the presentation.]

[NOTE B.]

Different Reds.

Comparison. Hold two reds before the class.—Are these exactly alike ?

What is the name of the first color ? *Ans.* Red. Of the other ? *Ans.* Red.

I ere are two red cards (apples, boxes, bits of worsted, ribbon, etc.)—Are they just alike ? Then there are more reds than one. Find several different reds.

Lighter and darker. Which is the brightest, or reddest red of these three in my hand ? Find the brightest red you can. Can you find a darker red ? Can you find one that is lighter, or not so red as the first ?

[NOTE C.]

Color and Form Combined.

To strengthen the sensation of different colors, while giving or reviewing form lessons on the square. Hold before the class a colored square.—What color is this? Does any one know what this figure is ? (Give or receive the answer.) *Ans.* A square. How many sides has it? Are the four sides of equal length? Measure your cards and see. How many corners are there? Are the corners alike or unlike? Then what do we know about a square? *Ans.* A square has four sides of equal length, and four corners all alike,—square, or upright, corners. A figure, then, with four equal sides and four corners alike is a square.

Repeat and revi w, varying the colors.

[NOTE D.]

Color and Form Continued.

Distribute colored cards cut in the shapes of the plane figures already taught,—having red, green, blue, etc., squares, triangles, circles. Ask all who have blue cards to hold them up, and let different children name the forms thus shown. Ask all who have squares to hold them up, and let different children name the colors thus shown, and so on.

[NOTE E.]

Practice Lesson in Color and Form. (*See Nos* 1 *and* 2, *p.* 21.)

Design for arranging colors and enlarging a square.

Show a square made of four small squares, in two colors, perhaps blue and yellow. Distribute colored cards for the children to copy the design.

How many colors? What colors? *Light* or *dark* blue? *Light* or *dark* yellow? How many pieces make this figure? What are they called? Why are they squares? What is the form of the figure made by these small squares? Then four small squares can form a larger square. Can you make a square with three small squares? With five? (Let the pupils try.) Can any one find out how many squares it will take to make another square larger than this one? How many? Then four or nine small squares will make a larger square.

PLAN OF THE SECOND YEAR'S WORK.

Review.

Assuming the first year's work to be well done, the children will still need practice in naming and comparing colors. In this review the teacher will naturally seek variety in presentation and in material, that the interest may be kept up.

New colors taught.

Add to the number of colors already known, and give the *commonly used* names of hues, tints, and shades of colors; —

1. Well-known reds,—as scarlet, crimson, pink.
2. " oranges,—as salmon, buff.
3. " yellows,—as lemon, straw.
4. " greens, —as olive, pea-green.
5. " blues,—as indigo, sky-blue.
6. " violets,—as purple, lavender.

Do not attempt to teach the many names used in art, and in the industries. Use the terms standard,

tint, shade, only when they come naturally and are needed.

The standard color (red, blue, etc.) is sometimes called the *spectrum* or *saturated* red, blue, etc.

Material.

One simple and inexpensive way of providing a class with material for the study of the range of colors taken in the second year, is to distribute envelopes containing small pieces of paper of the different colors, in their various shades and tints. The children may then select pieces that match in color larger pieces held up by the teacher.

Various colored worsteds may be used in the same way.

A variety of pleasing designs may be presented during this year, by the combination of squares and *different kinds* of triangles, and by introducing the rhombus. (See pp. 22-3.) The same designs may be repeated in different harmonic colors, and in different shades and tints of the same colors. Practice in reproducing these will strengthen the perception of both color and form.

Children may be trained to perceive symmetry in design in connection with harmony of colors. (See Note F.)

Let pupils learn,—

Tints and shades.

1. To distinguish the lighter colors as tints, and the darker colors as shades of the standard color. (See Note G.)

Scales.

2. To form scales, or the proper succession of shades and tints, of colors. (See Note H.)

Let pupils (See Notes I, K, L.)

3. Form designs of squares and triangles combined, and designs with the diamond, or rhombus. Designs copied.

4. Distinguish right-angled triangles and equal-sided triangles. Forms studied.

5. Observe that the square can be divided into *two* or *four* equal triangles.

6. That six or eight diamonds form a star-shaped figure.

7. That six equal-sided triangles form a six-sided figure, or hexagon.

In General.

8. Let the children write lists of things of a certain color, and facts learned about colors, thus combining exercises in writing and spelling with color-lessons.

9. Speak of the uses of colors; their ornamental effects, etc.

Suggestions for Lessons.

[Note F.]

Symmetry in Design with Harmony of Colors. *See No.* 10, *page* 22.

The following form of class-exercise is easily arranged.

Upon a piece of black cloth, stretched over a frame and placed before the class, pin pieces of colored paper. to form a design Let different children select and pin upon the cloth the different pieces required to reproduce this design. There should be variety enough in the shape of the pieces to require careful attention in arranging the reproduction. Harmonious colors should always be presented.

[Note G.]

Standard Colors, Tints, Shades.

The standard.

Let several children select a bright red. Who has the brightest? We will call this the *standard* or reddest red. Each child take standard red.

Is this color in my hand lighter or darker than the standard red?

Tints.

We call this lighter color a tint of red. It is red, but not the brightest red.

Here is another light red. Are these two just alike? *Ans.* One is lighter than the other.

Here is also a tint of red; it has less red in it than the first tint.

Can you find one with still less red – a *very* light tint?

Shade

Find the palest tint—one almost white.

[Give similar lessons for other colors, and for *shades* of the colors.]

Tints and shades. How produced.

These tints may be shown with crayons or paints. A slight brush of a given color over white paper makes a light tint, a second brush deepens it, and so on. Repeated brushes of the color will deepen it into darker and darker shades. Successive brushes on a black ground will produce shades in the reverse order. In general, we may say, that more or less white with a standard color will produce successive tints of that color, and more or less *pure* black with it will produce successive shades. Black pigments are not pure enough to make this statement true for all colors.

[Note H.]

A Scale of Color. (*See page* 22.)

Scale of a given color formed.

Is this a shade or a tint of blue? Is this shade (or tint) darker or lighter than the first? Show me a shade (or tint) between these two. What color is this? (Holding up standard blue.)

Find the next darker blue. We will place it on the left of the standard. We will place the proper tint on the right of the standard. Must the next shade on the left be darker or lighter? *Ans.* Darker. Must the next tint on the right be darker or lighter? *Ans.* Lighter. And so on.

Proceed thus to form the scales of different colors as far as materials permit.

The chart and packet of cards referred to on page 6, illustrate nine scales, with five tones in each scale.

Form and Color Combined.

[NOTE I.]

See No. 12 *a, page* 22.

How many colors here? What colors? Light or dark red (or violet)? Light or dark green (or yellow)? How many small pieces in the whole figure? How many kinds of pieces? *Ans.* Two. What are they? *Ans.* Squares and triangles. How do you know this is a square? Why is this a triangle? What is this red (or violet) piece? *Ans.* A triangle. What is this green (or yellow) piece? *Ans.* A triangle. What is made by putting them together in this way? *Ans.* A square. Then these two triangles make a square; or, this square is formed by two triangles.

Practice in color and form combined.

Square from two triangles.

[NOTE K.]

Same or Similar Design.

Let the children reproduce the design. What did you learn in your last lesson about a square? *Ans.* One square will make two triangles, or two triangles put together make one square. Put two triangles together so that they will make a square. See if you can change the places of the purple and the yellow triangles. If the purple triangle were smaller than the yellow, could it take

Two equal triangles make a square.

he place of the yellow one? Then the two triangles that make the square must be *equal* or *alike* in size.

Do the two triangles look alike? Examine carefully, and see *how* they are alike. (Some of the class will perceive that each has one square or upright corner, like the square, and two equal sides which are the sides of the square.) What did we learn the last time? *Ans.* That two triangles make a square. What more have we found out to-day? *Ans.* The triangles are of the same size and just alike, each with one upright corner and two equal sides. In what other way can you say this? *Ans.* A square can be divided into two equal triangles, each with one upright corner, or *right angle*, and two equal sides. (Get this and similar statements from the class.)

What kind of triangles?

How must a square be divided? (Let the children fold or cut paper squares diagonally.)

Square of four triangles.

[Show in another lesson, using a different design (No. 12, *b*, page 22), that one square will make four equal triangles.]

[NOTE L.]

Design with Equal-sided Triangles. (*See No. 6, page* 21.)

What colors? Light or dark blue? Light or dark orange? How many and what kind of pieces? Why are these pieces triangles? Place two together, and see if you can make a square? Why not? Are *these* different from the triangles of the last design (showing No. 12, *b*)? Look well and find out why they are different from those? *Ans. These* have no upright or square corner. In what other way are they different from those. These have *all* the sides equal; the others have two sides equal and one side longer. Now put one triangle on another, so that they fit thus. Now turn one partly around. We find that whichever angles come together they all fit; therefore they must be all alike. This kind of triangle, then, has all three sides alike, and all three angles alike. So you find that, though all squares are alike, there are *different kinds of triangles.* We must therefore have different names for them. We call this kind the *equal-sided* triangle. Why? And this other the *right-angled* triangle. Why? Then what two kinds of triangles have you learned?

Equal-sided triangles.

Different kinds of triangles.

The form of any plane figures used in the lessons in drawing may be fixed in the minds of the children by presenting them in bright colors. Other plane figures.

PLAN OF THIRD YEAR'S WORK.

1. Prismatic, or rainbow colors.

Show by the prism that sunlight contains all colors, except those produced by mixing white or black with the prismatic colors.

A glass prism hung in a sunny window is an attractive feature of a primary class-room, and familiarizes the children with the true spectrum colors in their proper relations. The prism and the spectrum colors.

This succession of colors may be presented by an arrangement of colored papers or paints; or, better still, by threads of worsted drawn through perforated cardboard, as the gradations of color can thus be preserved.

The children may make an imitation of the solar spectrum by selecting and placing in proper order skeins of colored worsteds or spools of silk.

Let the children see that the soap-bubble shows the prismatic colors, and tell them that, when the sun shines on drops of rain, they, like the soap-bubble, give the same colors, and so we call these the rainbow colors. Rainbow colors.

A circle of card-board, on which the prismatic colors are properly arranged, can be twirled rapidly, as by putting it on a teetotum, till the children find that the colors are combined again in their eyes, and the card seems to be of a uniform gray. The effect Prismatic colors combined.

would be white, if we could obtain perfectly pure colors.

Tints and shades continued.

2. Further practice in tints and shades, by forming scales of different colors with worsteds, etc.

Pigments mixed.

3. Also practice in mixing paints or pigments.

Here the teacher can show the effect produced either by mixing blue and yellow paint, or by passing the sunlight through both blue and yellow glass, (the result being green); and the different effect by twirling teetotum on which sections of blue and yellow paper have been arranged, (the result being a light gray). These facts can be learned early by observation, though any attempt at explanation belongs to advanced study.

Different result by mixing paints and by combining the same colors in the eye.

4. Complementary or contrasting colors and harmony of colors

Complementary color, how found.

Find the true complementary of a color.

The simplest way, perhaps, is to put a colored card on a black surface, and look steadily at it; then on quickly removing the card, its complementary color will be seen for an instant in the same place.

Variation in complementaries.

Notice that different hues of a color give corresponding variations in the complementaries.

Compare colors that contrast well and tone well.

Harmony of colors.

5. Show pairs of harmonic colors; train children to recognize them by selecting them from mixed worsteds, colored papers, etc.

6. Show application of harmony of colors in dress, nature, etc.

Designs for practice in color and form.

7. Let pupils reproduce more difficult designs, and make original ones. (See page 24.)

8. *Form in Connection with Color.*

[For method of study, see Suggestions for Lessons in the second year.]

Compare a square and a rhombus. How alike? How unlike?

Compare a square and a rectangle.

Compare a rectangle and an oblique-angled parallelogram.

The study of plane figures will come also in connection with drawing, and the presentation of these figures in bright colors will aid the lessons in both drawing and form.

The study of color and form an aid to drawing.

The simple solids will have been taught in the form-lessons of the first and second years, and the representation of some of them (as the cube and the prism), in tints and shades of a color, will produce a pleasing and striking effect, and will perhaps, give pupils hints as to the distribution of light and shade in drawing solid forms.

9. *General Information.*

Colors. Where found?

Plants, metals, etc., used for dyes and paints,—indigo, gamboge, cobalt, cochineal, etc.

Coloring by *dyeing*, and coloring on the surface only, as by *painting* and *printing*.

Common names of colors of animals, especially horses. (Read advertisements of sale of horses.)

Emblematic colors: as purple, royalty; red, war; white, peace; etc.

Statements for Teachers.

Probably very little of what follows will be used in the class, but it may be helpful to teachers in answering questions.

Color is in the light, and objects have color only when they are in the light. They give to our eyes the light that falls on them.

Why objects have different colors.

Some things give us back only one color of the light that falls on them, and hide (or absorb) all the other colors; then we call them red, green, etc. according to the color they give our eyes.

Some things do not keep any of the sunlight colors, but give them all back, and are therefore white to us.

Some things absorb all the sunlight colors, and give out none, and are therefore black.

Everything seems black in the darkness.

Transparent things, as clear water and glass, let the light go through them, and so neither hide nor show color.

Highly polished metal (silver, tin, etc.) throws back the light from its surface, and so looks bright.

Quicksilver is put on the back of transparent glass to make mirrors, so that we may get back the light that falls on them. When we look in the glass we see ourselves by the very light we give the mirror.

Children can understand that as they know the difference in musical tones by the ear, so they know the difference in color by the eye. They may be told that, when they are older, they can learn

more about color, but that many things about it still puzzle grown people.

Scientific theories.

The teacher should be familiar with the present theories: (1) of light as the result of undulations in an ether pervading all space; (2) of the different length and speed of the tiny light-waves, as corresponding to different color-sensations; (3) of interference with these waves in a sunbeam, as the cause of the prismatic colors; (4) of the difference in color effects when pigments are mixed, and when the same colors are combined in the eye; (5) of the three different sets of nerve-fibres, as corresponding to the three primary colors, red, green, violet; and the explanation thus offered of seeing its complementary when the nerve responsive to one of these colors is fatigued.

Though none of these points belong to color-lessons in primary schools, a knowledge of them will give the teacher facility and clearness of illustration, and increase her interest in the simplest form of instruction.

OCCUPATION FOR TRAINING BOTH EYE AND HAND, AND FOR IMPRESSING BOTH COLOR AND FORM.

First Year.

A variety of simple designs can be made of squares and triangles, used separately and in combination. Cut these forms out of colored paper, large enough to be seen across the schoolroom, and paste them upon cardboard, to make the following and other pleasing designs. Place one design before the class, and provide the children with material to reproduce it, in reduced size, upon their desks. By proper arrangement of designs, early though unconscious perception of harmonious combinations of both color and form will be secured, and also accurate training of both eye and hand.

Material for this occupation is easily procured, as sheets of cardboard of various colors, cut by machine into squares or rhombs of convenient size, can be purchased.

The squares need only to be divided with knife or scissors to give triangles of the right size for designs combining squares and triangles.

Each design can be reproduced by the children in different colors, keeping harmonious combinations. Large classes can take this occupation ("busy work") in sections, and thus a sufficient supply of material is practicable.

DESIGNS.

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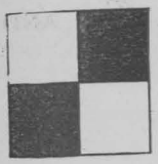

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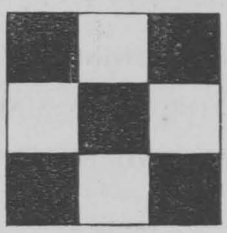

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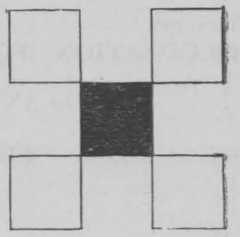

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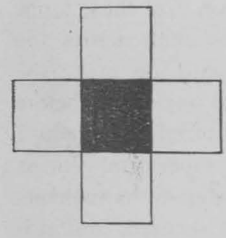

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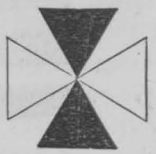

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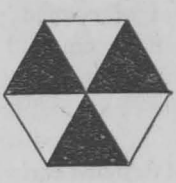

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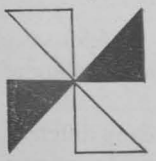

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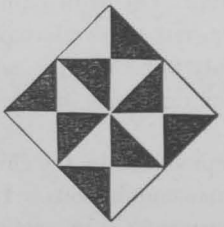

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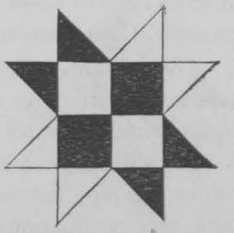


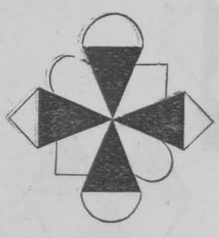
Squares and triangles of red and green, purple and yellow, blue and orange, or other pleasing combinations of colors. More than two colors may be appropriately used for designs 8 and 9.

Second Year.

Further practice in enlarging a square may be given. Designs 1 and 2 may be repeated and the enlarging carried as far as the material will allow, a variety of colors being used

Illustrations, in color, of the formation of a square by two, four, or eight equal triangles may be given. Designs 8 and 9 may be repeated, using the colors taught this year.

10



For Lesson under Note F.

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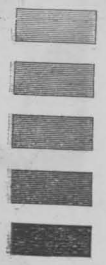

A Scale.

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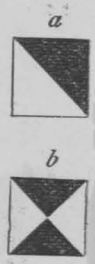

For Notes I and K.

ADDITIONAL DESIGNS.

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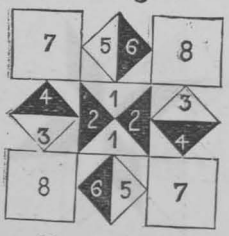

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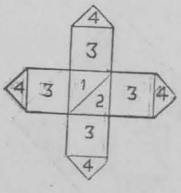

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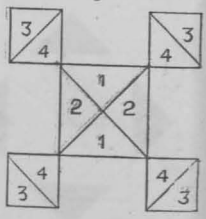

Four colors may be used for 14 and 15, and more than four colors for 13.

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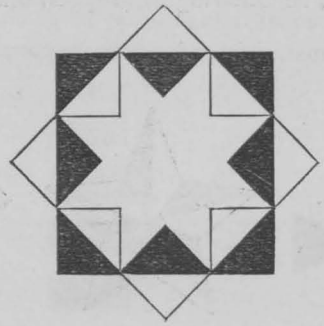

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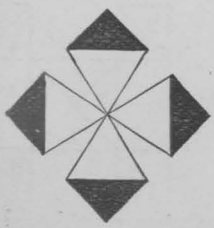

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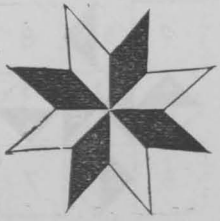

Third Year.

Pleasing designs may be made with triangles whose sides are unequal. The following will suggest others.

19

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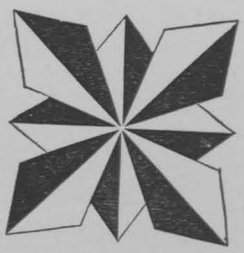
21

22



Many of the designs given are effective when reproduced in a shade and a tint of a color.

LESSONS ON COLOR

IN

PRIMARY SCHOOLS.

By LUCRETIA CROCKER,

One of the Supervisors of the Boston Public Schools.

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