AN EXPERIMENTAL STUDY ON THE INFLUENCES OF AN ENVIRONMENTAL COLOR STRUCTURE ON CHILDREN'S COLOR PREFERENCE

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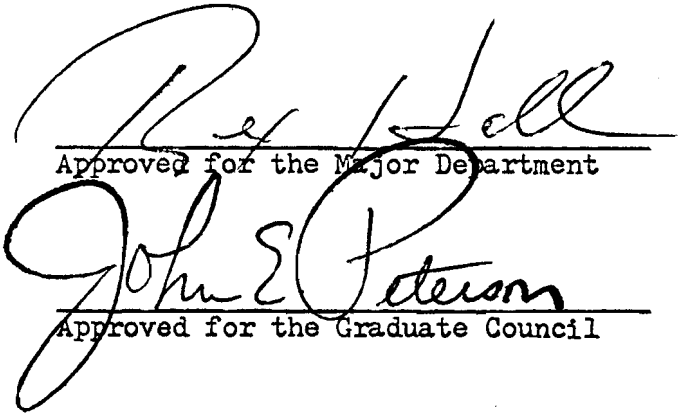

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T. M. T.

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CHAPTER I

INTRODUCTION

The investigator has become increasingly concerned about the development of perceptual and artistic awareness in the elementary child. This concern for the development of artistic and perceptual awareness has been broadened by an association with art educators and classroom teachers who apparently have used a multi-sensory approach to teaching with some success. During art teaching experience, the investigator was alerted each day to the necessity of approaching different children in more than one sensitizing experience for that child to achieve maximum benefits from the elementary art program.

Art educators are concerned with advancing visual education through the development of perceptual awareness. Color awareness has generally been taught in a formal abstract way, by using color wheels or other schemes. Apparently the child has been forgotten. Lowenfeld found in his studies that each child had his own color relationship.

> Although there are common colors used by most children for particular objects, each child develops his own color relationships. The origin of the individual color schema is probably to be found in a visual or emotional concept of color. Apparently, the first meaningful relationship that the child has with an object can determine this schema....This established color schema will not change unless the child becomes personally involved in an experience in which a change in color becomes important.[1]

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[1] Victor Lowenfeld, Creative and Mental Growth, Fifth Edition, (New York: The Macmillan Company, 1970), p. 165.

Thus, the researcher concluded that the standard methods of teaching color need re-evaluation and possible revision.

There has been a great deal of psychological research conducted in the general area of perception. However, very few experiments were available which correlated what one perceives to specific motivational approaches to color awareness.

Statement of the Problem

The purpose of this study was to determine the effect that the environmental color structures has on elementary children's preference of color. Thus, the problem was entitled, "AN EXPERIMENTAL STUDY ON THE INFLUENCES OF AN ENVIRONMENTAL COLOR STRUCTURE ON CHILDREN'S COLOR PREFERENCE".

Importance of the Study

Art educators are now responding to the demands of more sophisticated students who bring with them into the classroom a background of vicarious experiences which draw not only from all corners of the world, but including also visual proof of outer space. Decisions by art teachers in developing learning experiences for children are being made on the basis of their knowledge of the nature of art and a better understanding of the nature of learning in children. There has been progress in the development of more meaningful and effective methodology in the field of Art Education. However, much experimentation remains to be done. Therefore, the importance of this study have been based on these objectives:

findings of recent research in the field of Educational Psychology and Art Education that demonstrates the interrelatedness at the perceptual level of sensitivity systems and, to test the effectiveness of a multi-sensory approach in the teaching of color concept and preference.

Definitions of Terms Used

For the sake of clarity in considering all aspects of the subject, it was determined to define some of the terms which are pertinent to this type of investigation.

Color. This term was interpreted as meaning the sensation resulting from stimulation of the retina of the eye by light waves of certain lengths. The colors used in this experiment were the following: Red, Blue, Yellow, and Green.[2]

Awareness. Awareness was observed as having obtained knowledge of something through alertness in observing or interpreting what the child sees, hears, or feels. Conscious awareness implies awareness of a sensation, feeling, fact, or condition.[3]

Perception. This term implied the awareness of objects or other data through the medium of the senses. This occurred when the students were gaining knowledge through the process of perceiving.[4]

Environment. The word environment in the study indicated circumstances and influences surrounding the development of the child.[5]

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[2] Webster's New World Dictionary, College Edition: (Cleveland and New York: The World Publishing Company, 1966), p. 289.

[3] Ibid., p. 103.

[4] Ibid., p. 1085.

[5] Ibid., p. 486.

Experience. This term implied all that has happened to the child, his individual reaction to events by personally undergoing or observing something or things in general as they occur.[6]

Sensitizing. Sensitizing was interpreted as receiving and responding to stimuli from sense impressions. This occurred when the child was made sensitive.[7]

Gustatory Sensitizing Experience. This referred to the experience which was concerned with the sense of taste.[8]

Tactile Sensitizing Experience. A tactile sensory experience was one that was perceived by the sense of touch.[9]

Olfactory Sensitizing Experience. This term implied using all those experiences which are concerned with the sense of smell.[10]

Kinesthetic Sensitizing Experience. This term included the sensory experience of sensation of position, movement, and tension, perceived by the muscles or tendons.[11]

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[6] Webster's New World Dictionary, College Edition, p. 512.
[7] Ibid., p. 1327.
[8] Ibid., p. 647.
[9] Ibid., p. 1483.
[10] Ibid., p. 1023.
[11] Ibid., p. 804.

CHAPTER II

REVIEW OF RELATED LITERATURE

Related literature, reviewed in preparation for this investigation, seemed to lie in three main categories. These were: (1) the role of the six sensitizing systems in perceptual learning; (2) the developmental role of the six sensitizing systems in children; and (3) the role of motivation for children studying art.

The Role of the Six Sensitizing Systems In Perceptual Learning

A review of the literature in psychology concluded that all the six sensitivity systems play a major role in perceptual learning. Thus, the researcher was concerned with the six sensitivity systems and how they influence children's preference of color.

> Any appearances, whatever present themselves not only when it's object stimulates a sense but also when the sense by itself alone is stimulated, provided only it be stimulated in the same manner as it is by the object.
> Aristotle, 330 B.C.[12]

The six sensitivity systems included in this research were visual, auditory, gustatory, tactile, olfactory, and kinesthetic. Although these systems can focus on information separately, they often focus on the same information as a combination of systems functioning as one unit. This idea was assumed by the investigator to be a mutual acceptance among many authors.

Ray Barsch emphasized this point when he said, "they work

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[12]Aristotle, Quoted by James Gibson, The Senses Considered as Perceptual Systems, (Boston: Houghton Mifflin Company, 1966), p. xv.

together as a harmonious unit on interrelatedness."[13] He believed that they would be available for a lifetime: "not to operate simultaneously as a single unit but ready to stand in readiness to function in whatever degree of emphasis or extent of interchange may be required."[14]

Barsch,[15] Gibson,[16] Lowenfeld,[17] and Montessori[18] viewed the senses as channels of entry for information. Barsch, in his book Achieving Perceptual Motor Efficiency, maintained that each sense in its mechanical structure has some form of receiving part to pass stimuli along to other parts of the brain. As complex as the organizational structure of the sense organ may be, its primary value is to be a service function of the brain. No interpretation takes place in the sense organs; they serve only to pass information to the brain. In the brain, stimuli are converted to information. In some unknown way, the brain converts vibrations, impulses, waves, texture impulses, and varying effects into information. Barsch related these factors to the ability of the human organism to process raw data from his environment and turn it into information.

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[13]Ray H. Barsch, Achieving Perceptual Motor Efficiency, Vol. 1, Perceptual Motor Curriculum (Seattle: Special Child Publications, 1967), p. 42.

[14]Ibid., p. 43.

[15]Ibid., p. 44.

[16]Gibson, op. cit., p. 32.

[17]Victor Lowenfeld, Creative and Mental Growth, Fifth Edition, (New York: The McMillan Company, 1970).

[18]Ellen Yale Stevens, A Guide to the Montessori Method, Third Edition (New York: Frederick A. Stokes, 1913), p. 72.

> To pursue a modern analogy, the human organism is a computer island surrounded by an open sea of raw data constantly pounding against its shores, demanding information.[19]

James Gibson wrote about the perceptual systems as ways of seeking and extracting information from the environment through the flowing array of ambient energy.[20]

Viktor Lowenfeld summed up the importance of the sense in Creative and Mental Growth when he said, "It is only through the senses that learning takes place." He further emphasized the role of the senses as a medium for interaction between man and environment.[21]

The Development of the Sensitivity System in Children

Learning for the young child is largely dependent upon the efficiency of his sense systems. This seems to be a fact that was generally agreed upon by most authors. Marian Breckenridge and E. Vincent explained, "Intelligence is entirely dependent upon the sense organs (eyes, ears, taste, smell, and touch) for development."[22] They expanded this view by writing, "A serious deficiency in more than one of these areas almost always proves fatal to the intellectual development of nearly all children."[23] The writers

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[19] Barsch, op. cit., p. 42.

[20] Gibson, op. cit., p. 22.

[21] Lowenfeld, op. cit., p. 4.

[22] Marian E. Breckenridge, M.S. and E. Lee Vincent, Child Development (Philadelphia: W. B. Saunders Company, 1965), p. 276.

[23] Ibid.

by saying "that how well the native intelligence develops is dependent upon the richness of the learning opportunity."[24] However, at birth, babies do not have full use of their sensory equipment, although it is structurally well developed. Breckenridge and Murphy explained:

> Although the sense organs are structurally well developed at birth the child comes to use them with great deficiency and meaning with further development of the nervous system and with further experience.[25]

At first, the infant is able to react in response to stimuli in the immediate environment. Later, similar stimuli will evoke greater meaning based on previous experiences. When a reaction to stimuli, such as sound, form, light, occurs, this is sensitivity. Perception occurs when this reaction initiates a series of associations.[26]

Pressure and touch sensitivity seem to be present in newborn infants. Breckenridge and Vincent wrote, "The sense of touch seems to function most nearly perfectly at birth, a slight touch on the cheek setting up the sucking reflex."[27] The child uses his sense of touch for investigating and exploring things in his exciting world. Children at the preschool age love to touch everything in their surroundings and examine everything with which they come in contact.[28]

According to Breckenridge and Murphy, sensations having their

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[24]Breckenridge and Vincent, ibid.

[25]Marian E. Breckenridge, M.S. and Margaret Nesbitt Murphy, Ph.D., Growth and Development of the Young Child (London: W. B. Saunders Company, 1969), p. 265.

[26]Ibid., p. 324.

[27]Breckenridge and Vincent, op. cit., p. 275.

[28]Ibid.

origin in the skin have their own receptors, which are unevenly distributed over the body.[29] Most authors contended that the sense of touch is not just in the hand. Some areas of the skin are more sensitive to stimulation than others. Barsch concluded from his studies of Franz and Ziglar and Barrett that the arm was more sensitive than the thigh, the palm seemed to be more sensitive than the forearm, and the fingertips to be more sensitive than the palm.[30] Maria Montessori agreed with the sensitivity of the fingertips. She discovered that the sense of touch is more developed in young children than the sense of sight. She stressed tactile exercises by teaching the children to contrast, to classify, and to compare the texture of different objects.[31] Breckenridge, who was in agreement with Barsch and Montessori, pointed out that in the tongue and fingers the sense of touch develops so that it becomes an important sensory window to the world.[32]

Edith Leonard, Dorothy Van Deman, and Lillian Miles in their book Foundations of Learning in Childhood Education gave an example of the development of tactile sensory perception in the feet of children. A group of children wrote the following poem after having had the experience of removing their shoes and "sensing" with their feet.

When I walk on the rug
It feels soft and snug.

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[29]Breckenridge and Murphy, op. cit., p. 326.

[30]Barsch, Achieving Perceptual Motor Efficiency, op. cit., p. 205.

[31]Stevens, A Guide to the Montessori Method, op. cit., p. 91.

[32]Breckenridge and Vincent, Loc. cit., p. 275.

When I run on the grass I try to be fleet
Because the grass whiskers thickle my feet.

I pat a wee frog house with my hand
And push my foot into damp cool sand.

I'll step in the mud and print with my toes
To show which way the 'possum goes.

Concrete is hard and slick and cool
When I walk on it in the morning to school.

But by noontime it's the other way
It feels hot to my feet when I run and play.[33]

Mary Sue Childers found in her study on tactile sensory experiences that the role of tactile sense in perceiving contributed to the aesthetic development of an individual. Thus, she concluded that it seems equally important and obligatory to develop this potent sense of perceiving aesthetically in young children.[34]

Breckenridge and Vincent have indicated that opinions differ about the development of taste in children.[35] However, they went on to say that "Most experiments report that sweet flavors are reacted to first."[36] "Children will notice and react," they continued, "to change in formula at the age of 2 or 3 months."[37] Breckenridge and Murphy pointed out that the taste in infants may

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[33]Edith M. Leonard, Dorothy D. Van Deman and Lillian Miles, Foundations of Learning in Childhood Education (Columbus, Ohio: Charles E. Merrill Book Company, Inc.), 1963, p. 222.

[34]Mary Sue Childers, "An Experimental Study on the Influences of Tactile Sensory Experiences on the Schema of Child Art" (thesis), Kansas State University, 1963.

[35]Breckenridge and Vincent, Loc. cit., p. 276.

[36]Ibid.

[37]Ibid.

be different than in adults.[38] Breckenridge and Vincent supported this point of view when they said that "children will accept a wide variety of tastes such as cod liver oil, turnips, liver and other strong tastes."[39] A child will imitate the attitude of distaste from an adult.[40] This sense also serves as a supportive or enriching agent to the other senses.[41]

The researcher concluded that many authors agreed that the auditory sensitivity system is an important means by which the child relates himself to his environment. Sound in some form is always an integral part of the child's environment. Barsch,[42] Brackbill,[43] Breckenridge and Murphy[44] agreed that an infant at birth does not have full use of his auditory equipment. From eighteen months to three years, there is a rapid development of perception and discrimination of sounds. During this period the child learns to identify sounds that have not previously had meaning. A child's preschool listening ability develops according to the extent of listening demands on him by his environment. Oakson said, "the child's own sensitivity to sound reflects the taste of the people about him. Many times a child will hear things adults

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[38]Breckenridge and Murphy, op. cit., p. 328.

[39]Breckenridge and Vincent, Loc. cit., p. 276.

[40]Ibid.

[41]Ibid.

[42]Barsch, op. cit., p. 234.

[43]Yvonne Brackbill, Infancy and Early Childhood (New York: The Free Press, 1967), p. 98.

[44]Breckenridge and Murphy, op. cit., p. 327.

do not and will call their attention to it, as a bird call."[45]

It appeared to the researcher that little investigation has been done in direct relationship to developmental studies in the area of olfactory sensitivity in children. Barsch in his studies noted that the most neglected field of scientific inquiry is the study of olfaction.[46]

Most authors believed that the area of smell is fairly discriminative after the first few months of life.[47] Breckenridge and Murphy noted, "that the baby's pleasure in smell, the same as in taste, does not always correspond with adult judgment."[48] A child's sensitivity to odor will last his lifetime.[49] Barsch gave examples of some of the smells the child will encounter in his lifetime, "Flowers, perfume, food, dampness, decay, and countless other smells are yet to come."[50]

"Children learn to see," said Barsch, "in order that they may see to learn."[51] He contended that vision is the most expansive and rapid system for processing information. He emphasized the point that the other sensitizing systems aid in the development of vision, and in turn, vision expands and enriches the functional

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[45]Constance Oakson, An Experimental Study of the Influence of Auditory Sense on the Schema of Child's Art, University of Kansas, July, 1965.

[46]Barsch, op. cit., p. 198.

[47]Breckenridge and Murphy, op. cit., p. 325.

[48]Breckenridge and Vincent, op. cit., p. 328.

[49]Barsch, op. cit., p. 198.

[50]Ibid., p. 198.

[51]Ibid., p. 285.

efficiency of all the others.[52] Breckenridge and Murphy stressed the importance of vision when they said, "Through the sense of sight the child detects light, senses form, recognizes color and perceives depth and distance in space."[53]

The sensory cells of the retina, the rods, function immediately after birth. Later, the cones, the other sensory cells, develop, and these insure recognition of color.[54] Staples,[55] Breckenridge and Murphy[56] believed that possibly as early as the third month discrimination of color begins. Eye movements start to coordinate after the first few months and are well coordinated by nine months. In early life the eyeball is short and shallow, which produces a normal farsightedness. This normally disappears as the antero-posterior of the eyeball increases to adult dimension, which occurs by the time the child is six years old. Control or straight vision develops gradually until it reaches the adult level, around the seventh year.[57] In discussing the development of the visual sense, Barsch said that the child's basic training in visual efficiency has been completed by the time he has reached his seventh birthday, if his visual experiences have been comfortable, progressive, and developmentally expansive. Visual development after that time can

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[52] Barsch, op. cit.

[53] Breckenridge and Murphy, op. cit., p. 331.

[54] Ibid., p. 330.

[55] R. Staples, "The Response of Infants to Color," Journal of Experimental Psychology, 1932, Vol. 15, p. 119.

[56] Breckenridge and Murphy, op. cit., p. 330.

[57] Ibid., p. 328.

probably be considered a refinement or sharpening of details, expanding and exploring of space.[58]

The researcher found that literature containing knowledge of the part the kinesthetic sense system plays in learning was incomplete. Breckenridge and Murphy referred to Carmichael as citing evidence that the kinesthetic receptors are functioning well before birth and are rather highly organized by the time an infant is born.[59]

Barsch in his discussion suggested, "The kinesthetic fluency which the child achieves during the first two years probably sets his level of kinesthetic sophistication. If there is any slowing down, or misleading, in the motor feedback system at the time, he is likely to remain kinesthetically naive into his adulthood."[60] Barsch suggested that kinestesia was dependent upon the receiver. He explained this fact by saying, "Kinestesia does not just happen. The perceiver must make it happen."[61]

Role of Motivation for Children

Art educators such as Lowenfeld,[62] Jefferson,[63] McFee,[64] and Herberholz and Lindeman[65] have stressed the importance of the child's

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[58]Barsch, op. cit., p. 271.

[59]Breckenridge and Murphy, op. cit., p. 334.

[60]Barsch, op. cit., p. 224.

[61]Ibid., p. 223.

[62]Lowenfeld, Creative and Mental Growth, p. 65.

[63]Blanche Jefferson, Teaching Art to Children (Boston: Allyn and Bacon, Inc., 1959), p. 232.

[64]June McFee, Preparation for Art (San Francisco: Wadsworth Company, 1961).

[65]Earl W. Linderman and Donald W. Herberholz, Developing Artistic and Perceptual Awareness (Dubuque, Iowa: Wm. C. Brown Co., 1964), p. 47.

ability to identify with the motivating stimuli. Lowenfeld had advanced the idea that motivation should be directed toward the child's own experience. In support of this theory (in reference to the child and his art experience) he stated:

> One of the most important elements in any art experience is the degree to which children are truly involved in the experience itself. The urge and excitement that children can bring to an art experience is dependent to a great deal upon their motivation.[66]

Lowenfeld further emphasized the idea that any art motivation needs to stimulate the child's thinking, feeling, and perceiving. The success of an art activity depends largely upon motivation to translate it into a meaningful experience. The experience "should stimulate the child's awareness of his environment."[67]

From a similar point of view, Blanche Jefferson recognized the child's needs for a strong motivation to begin and follow through an art experience. "It is the responsibility of the teacher to induce action and to arouse the child enough so that the child will work hard in his own manner."[68]

June McFee related the importance of providing the stimulation to the direct experience. "If in the elementary grade and high school, children are encouraged to see and respond through motivating art experiences," she said, "they will not grow up to be visual illiterates (unable to read the visual details in their environment)."[69]

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[66] Lowenfeld, Loc. cit.

[67] Lowenfeld, op. cit., p. 32.

[68] Jefferson, op. cit., p. 67.

[69] McFee, op. cit., p. 199.

Herberholz and Linderman concerning self-identification and enthusiasm for art motivation.[70] In their book, Developing Artistic and Perceptual Awareness, is included one chapter entitled "Motivation as the Mainspring of Art," in which they stated:

> Children need direction and strong challenge in their art thinking. They need to get excited about their ideas. In order to re-create an experience through art media, the child needs to recall experiences vividly.
>
> He must be stirred sufficiently that he has a desire to communicate his thought in visual terms.[71]

They pointed out their objective in working with children deals with how to stimulate their art thinking and develop their art skills. They listed ways to motivate children in their art as the following: "(1) verbal experiences, (2) visual experiences, (3) material experiences and (4) sensory experiences."[72]

Summary

The researcher, in the process of examining the above noted literature, investigated much research that was relevant to this experimental study. It was concluded that: Learning was through the sensitivity systems. The systems operate harmoniously and interrelatedly, and were programmed for life by early childhood experiences with environmental stimuli. Level of functioning was dependent upon the operational efficiency of the various systems. Conclusions related to the various sensitizing systems and pertinent to the study were: Tactile sensory perception was well developed at

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[70] Herberholz and Linderman, Loc. cit., p. 47.

[71] Ibid., p. 50.

[72] Ibid., p. 50.

birth, with receptors located unevenly over all parts of the body. Reaction to different taste sensations was recognized as early as two months after birth of the child; attitudes of distaste were often influenced by adult attitude; the sense of taste supports and enriches the development of the other senses. The rapid development in early childhood of the auditory systems was dependent upon the extent of the auditory experiences; they can make the child selective in his response to these stimuli. Early development of the olfactory systems was demonstrated with new experience aiding in the continual olfactory growth. The visual system, functional at birth, with mature development by about the seventh year, was recognized as being aided by, and as aiding in, the development of the other systems, with refinement and expansion of the system going on after physical maturation. The level of childhood kinesthetic function was suggested as set by the age of two years. The kinesthetic response, unlike other sensory response, was deliberate rather than spontaneous.

Art educators agreed that motivation for experience in art must intensely stimulate the child's sensory systems, his thinking process, and his emotions, must be directed toward the child's own experience, and may be through any combination of sensory-system stimuli.

These facts that have been compiled seem to lead those responsible for art education to design a program for perceptual learning experiences which utilizes a multi-sensory methodology.

The objective that was inferred was to develop a multi-sensory approach for the enhancement of color awareness. How this goal could

be accomplished was not directly suggested in the related literature. Indirectly, these projections began with the development of a total structured color environment, rich in sensory stimuli and extensive research in the area of colormetrics.

CHAPTER III

PROCEDURE

The experiment was designed to investigate the influences an environmental color structure had on elementary children's preference of color. This investigation involved three groups composed of first, second, and third grade children at West Elementary School in New Buffalo, Michigan. The socio-economic level of the children in this study extended from lower to middle class families. Grouping within the grades was heterogeneous.

For the experiment, Group One consisted of seventy-three first grade students, Group Two had seventy-six second graders, and Group Three was one hundred and one third grade students. Hereafter they are referred to as Group I, Group II, and Group III respective to their grade level.

All three groups were given the testing instrument before and after they were introduced to the environmental color structure. An example of the testing instrument is in the appendix A on page 46. The amount of time spent on the test was twenty minutes. The time was divided equally between Part I and Part II. Of the ten minutes in each part, seven minutes was allowed on the section that involved naming things in the color they had chosen.

The investigator felt that an explanation was needed before using the testing instrument because a discussion on colors preceding the test would influence the children's selection and knowledge of colors. The children were asked to place in front of them, on their desks, the following different crayons: yellow, green, red,

and blue. This was to assure the investigator that they knew the names of the colors that were involved. It would also aid the children to visually recall their past experiences with colors. To build up their self-confidence, they were told this was a test in which everyone would get every question right, that spelling would not be a factor. It was stressed that the color selection should be their "very, very" own choices, not any one else's. The investigator noticed that the children quickly marked their preferred color. Finishing this part of the test, they were asked to name a mood or feeling that would relate or suggest how they felt about their preferred color. Following this section of the test they were directed to list as many things as they could in their preferred color.

Part II of the test was exactly like the first part except that this section was on their least preferred color. To make sure the children understood the term "least preferred color," the investigator also used the words "throw-away" or "take away." The children seemed to have more difficulty in selecting a least preferred color than they had in selecting their preferred color.

Two weeks later, the children in the experimental groups experienced the environmental color structure. By way of introduction to the sensitizing experience, they were given a short motivational talk about the exciting world of color. The children were encouraged to participate in the discussion in order to become involved. After the motivation they walked down the halls to where the color structures were set up. The children were not given a choice of which color structure they would like to enter first. Instead, the investigator selected the children at random for entering the structures.

The children were lined up and numbered (1) Red, (2) Blue, (3) Green, and (4) Yellow. The children were told that, while they were inside the color structure, they could look, squeeze, pinch, touch, feel, taste, and explore anything inside the color structures.

After the child entered the color structure, an assistant turned on a recorder of background music. The child's sensitizing experience in the environmental color structure lasted about eight minutes. From the moment the child went into the structure, he began to produce his own noises relating to the environment. After the child crawled out of the structure, he was given a glass of a matching flavor Kool-Aid. While he was drinking the Kool-Aid, he was given a list of words to read. If the child was unable to read the word, it was read to him. If the child desired, he could underline a word that he thought went with the color and corresponded with the color of the structure from which he had just emerged. This was done very quickly so that the answers would be spontaneous. The child then proceeded to the end of the line of a different color structure. This gave the child a time span of at least twenty-five minutes before he entered the next color structure. The investigator felt this time span was necessary because it would give the child time to think about his previous experience. While he was waiting, the child could draw on Manila paper. The investigator limited the child to two color structures a day because of the intensity of the effect. Three days later, after the first sensitizing experience, the children went into the remaining two color structures.

One week later, after the color sensitizing experience, they were given the experimental test instrument again. Again, the children were given the test without any discussion or motivation.

CHAPTER IV

ANALYSIS OF DATA

A description of the instrument used to test the data, an examination of the tabulated data and a report of the test of the hypothesis of this research were included in this chapter. The z test for measuring a proportion (p) "for a large sample"[73] was the instrument used for measuring preferences of color choices. After the data was calculated and the numerical data obtained,[74] the researcher was able to test the hypothesis in this chapter.

Description of the Instrument

The researcher used the z test which is a one tail test to test the data. Basically, the test involved the formulation of the null hypotheses and the distribution of the observed and expected results. "The large-sample normal-curves methods employed to solve estimation for binomial p can be employed also to test hypothesis about p."[75] If the two sets are within the range of 1.645, the null hypothesis should be accepted. If discrepancies between the two sets are outside the range 1.645, then obviously the observed proportion (p) does not agree with those which were the expected proportion (p) and it can be concluded that the expectations were false, hence, the null hypothesis was false.

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[73]Paul Hoel, Elementary Statistics (New York: John Wiley & Sons Inc., 1966), p. 172.

[74]Statement by J. Stanley Laughlin, personal interview, July, 1972.

[75]Hoel, op. cit., p. 180.

Symbolically this is:

$$Z = \frac{P - p}{\sqrt{\frac{p\,q}{N}}}$$

where (p) is the observed proportion and (p) is the expected proportion. The researcher used the halo effect 10 per cent of the children would change their minds. This was expected because of the anticipation towards the experimental method.

Before the calculations could be stated for this test, a table was needed. The procedure for establishing this table is by (1) placing the selection of color before the test in the first column, (2) placing the selection of color after the test in the second column, (3) noting by an asterisk that an individual changed his color selection, and (4) tabulating the number of color changes. The researcher established the following tables to represent the selection of color preference before and after the exposure to the environmental color structures. Table I, Table II, and Table III are concerned with the changes of each individual's preferred color choice. Table IV, Table V, and Table VI indicated the changes of each individual's preferences of least preferred color.

TABLE I

Preferred Color Pre-test and Post-test

GROUP I

Pre-test	Post-test	Pre-test	Post-test
B	B	R	R
Y	Y	B	R*
B	B	B	B
G	B*	R	R
Y	R*	B	B
B	B	Y	Y
Y	Y	R	B*
R	R	G	G
B	B	B	B
B	G*	G	B*
G	G	R	R
B	B	G	G
Y	R*	R	R
R	B*	R	R
B	R*	R	R
R	R	B	B
Y	B*	R	R
R	B*	B	R*
B	B	B	B
B	Y*	B	B
B	R*	G	G
R	R	B	R*
R	R	B	B
G	G	R	Y*
B	B	R	R
R	Y*	R	R
G	G	G	Y*
B	B	R	R
B	R*		
B	G*		
Y	G*		
R	B*		
R	R		
R	R		
R	R		
B	B		
B	R*		
B	R		
R	R		
B	R*		
B	B		

*The changes in color preference are noted in the above table by an asterisk.

TABLE II

Preferred Color Pre-test and Post-test

GROUP II			
Pre-test	Post-test	Pre-test	Post-test
R	R	B	Y*
R	R	B	B
Y	R*	G	G
B	G	B	B
G	G	B	B
B	R*	R	G*
R	R	B	B
G	G	R	R
B	B	R	R
G	G	B	B
G	R*	B	R*
B	B	Y	B*
Y	R*	B	B
Y	B*	R	R
Y	Y	R	B*
Y	B*	R	R
B	R*	B	B
R	B*	R	R
R	Y*	R	B*
R	R	R	R
B	B	R	R
R	R	R	G*
B	R*	R	B*
B	B	R	R
B	B	R	R
B	G*	G	G
B	B	R	R
R	G*	R	B*
B	B	B	R*
R	Y*	Y	G*
G	Y*	R	B*
B	B	R	R
R	R	G	G
G	G	R	B*
Y	R*	R	R
B	B	B	R*
B	B	R	G*
R	R	G	G

*The changes in color preference are noted in the above tables by an asterisk.

TABLE III

Preferred Color Pre-test and Post-test

GROUP III

Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Y	R*	R	R	R	R
G	R*	R	B*	B	B
R	R	B	B	Y	Y
B	B	B	B	G	G
R	R	Y	Y	R	R
R	B*	B	B	Y	Y
B	B	B	B	Y	Y
Y	B*	R	R	B	B
R	R	R	Y*	B	B
R	R	G	R*	B	B
R	R	G	G	R	R
G	G	B	Y*	G	G
R	B*	R	R	B	B
R	G*	G	G	G	G
R	R	Y	B*	B	B
R	R	Y	Y	B	B
G	B*	R	R	B	B
B	B	G	G	B	R*
R	R	R	R	R	R
R	R	B	B	B	B
B	B	R	R	B	B
B	B	B	B	R	R
R	G*	B	B	B	B
R	R	B	B	B	B
Y	Y	R	R	B	B
Y	G*	G	G	B	B
B	B	B	B	B	B
B	B	B	B	B	B
B	B	R	R	R	R
R	Y*	G	G	B	B
Y	Y	B	B	B	B
G	B*	B	B	R	R
B	B	R	R	R	Y*
R	Y*	B	G*		

*The changes in color preference are noted in the above table by an asterisk.

TABLE IV

Least Preferred Color Pre-test and Post-test

GROUP I

Pre-test	Post-test	Pre-test	Post-test
Y	Y	B	B
Y	G*	G	G
Y	G*	Y	Y
B	Y*	G	G
R	Y*	Y	Y
G	G	Y	Y
G	G	R	R
Y	Y	G	G
Y	Y	Y	G*
R	Y*	G	G
B	Y*	G	Y*
Y	Y	R	G*
Y	R*	R	R
Y	Y	Y	Y
Y	Y	R	R
Y	Y	G	G
Y	Y	B	Y*
Y	Y	G	B*
B	G*	B	B
R	R	B	B
Y	Y	B	B
Y	Y	G	Y
Y	Y	Y	Y
Y	G*	Y	Y
Y	B*	Y	Y
Y	Y	R	R
Y	Y	Y	Y
Y	Y	B	R*
B	B	G	G
Y	Y	Y	Y
Y	R*	G	G
R	Y*	Y	Y
Y	Y	G	G
Y	G*	R	G*
Y	Y	Y	Y
B	B	Y	Y
Y	Y		

*The changes in color preference are noted in the above table by an asterisk.

TABLE V

Least Preferred Color Pre-test and Post-test

GROUP II

Pre-test	Post-test	Pre-test	Post-test
Y	Y	R	G*
B	G*	G	G
R	B*	G	Y*
Y	R*	Y	Y
R	Y*	Y	Y
Y	Y	G	G
Y	Y	Y	Y
B	Y*	Y	Y
Y	Y	Y	Y
R	R	Y	Y
B	B	G	B*
Y	Y	Y	Y
R	Y*	Y	Y
G	G	Y	B*
G	G	Y	Y
G	G	Y	B*
Y	Y	B	B
G	G	G	G
Y	R*	Y	G
G	G	Y	Y
Y	Y	G	Y*
Y	Y	Y	G*
Y	Y	G	Y*
G	Y*	Y	Y
R	Y*	G	Y*
R	R	R	R
G	G	Y	Y
Y	G*	G	Y*
Y	Y	Y	Y
R	R	B	G*
R	G*	Y	Y
G	Y*	Y	Y
Y	Y	Y	Y
Y	Y	Y	Y
G	G	Y	Y
Y	Y	Y	Y
Y	G*	Y	Y
G	B*	Y	Y

*The changes in color preference are noted in the above table by an asterisk.

TABLE VI

Least Preferred Color Pre-test and Post-test

GROUP III

Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Y	Y	G	G	B	B
Y	Y	B	Y*	Y	Y
G	Y*	Y	Y	R	R
Y	Y	Y	R*	G	G
G	R*	Y	Y	Y	R*
G	G	Y	Y	G	G
G	G	R	Y*	Y	Y
B	Y*	Y	G*	B	B
Y	Y	G	G	Y	G*
Y	Y	G	G	G	G
Y	R	B	Y*	B	B
G	Y*	Y	Y	Y	Y
Y	Y	Y	Y	Y	Y
Y	Y	G	G	Y	Y
Y	Y	G	G	Y	Y
R	R	Y	G	Y	Y
Y	Y	G	G	R	Y
B	B	Y	Y	G	G
Y	Y	R	R	R	R
G	G	Y	Y	Y	G*
G	R	Y	Y	G	R*
Y	Y	R	Y	G	G
G	G	B	B	R	R
B	B	Y	Y	Y	Y
G	R*	G	G	G	G
G	G	Y	Y	G	Y*
G	G	R	R	R	B*
G	Y*	G	G	Y	Y
R	G*	G	Y*	G	G
Y	Y	G	G	R	G*
Y	G*	Y	G*	G	G
Y	Y	G	G	R	R
Y	Y	Y	Y	G	G
Y	Y	B	B	Y	Y
G	G	Y	G*		
Y	Y	G	G		
Y	Y				

*The changes in color preference are noted in the above table by an asterisk.

The following table VII is a summary of the results tabulated in tables I through V.

TABLE VII

COLOR CHANGES SUMMARY

PREFERRED COLOR

GROUP	TOTAL	CHANGES	NO CHANGES
I	73	25	48
II	76	31	45
III	101	17	84

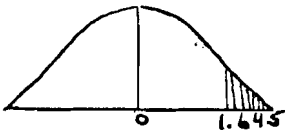
LEAST PREFERRED COLOR

GROUP	TOTAL	CHANGES	NO CHANGES
I	73	20	53
II	76	25	51
III	101	26	75

Test of the Major Hypothesis

In this research the level of significance was set at the level of .05. This means that if there is no relationship between the method and rating there is less than five chances per one hundred cases of obtaining by chance this distribution. On the z scale the critical region remains outside of the standard normal distribution of 1.645. A sketch of this distribution is given in Figure 1.[76]

Fig. 1



Areas of the Critical Region z

[76] Hoel, Elementary Statistics, p. 239.

The null hypothesis was stated as: the color environmental structures has no effect on children's color preference.

Symbolically this is: Ho $p > .10$

The researcher used Table VII on page 31 to calculate the results. z was then calculated by (1) dividing the number of proportions (p) by the number of proportions changed (p); (2) subtracting the number expected to change (.10) from the total number in the proportion; and (3) dividing the square root of the number expected to change (.10) times the number not expected to change (.90) which has been divided by the total number in the proportion (n). Symbolically this is:

$$\frac{-10}{\sqrt{\frac{(\ )\ (\ )}{n}}}$$

$Q = 1-p$

$p = \frac{\text{number changed}}{\text{total in sample}}$

The following are the calculations and the results that were obtained for z:

Preferred Color Group I

$n = 73$
25 changed
$p = 25/73 = .3425$

$$z = \frac{.3425 - .10}{\sqrt{(.10)(.90)}} = \frac{.2425}{.0351} = 6.9088$$

The result 6.9088 clearly lies outside of the standard normal distribution in the scale which demonstrates a significant change in the color preference of children in Group I.

Preferred Color Group II

$n = 76$
31 changed
$p = 31/76 = .4079$

$$z = \frac{.4079 - .10}{\sqrt{\frac{(.10)(.90)}{76}}} = \frac{.3079}{.0344} = 8.9505$$

The above formula demonstrates an even more significant change in color preference of children in Group II. The result 8.9505 occurs far beyond the normal standard distribution in the scale.

Preferred Color Group III

$n = 101$
17 changed
$p = 17/101 = .1683$

$$z = \frac{.1683 - .10}{\sqrt{\frac{(.10)(.90)}{101}}} = \frac{.0638}{.02985} = 2.2881$$

The result 2.2881 is beyond the normal standard distribution of the scale which indicated change; however, this change is not as distinct as the changes in color preference of Group I and Group II.

Least Preferred Color Group I

$n = 73$
20 changed
$p = 20/73 = .2740$

$$z = \frac{.2740 - .10}{\sqrt{\frac{(.10)(.90)}{73}}} = \frac{.1740}{.0351} = 4.9573$$

The result for the test of the least preferred color preference, Group I, exhibits significant change in preference. This number 4.9573 is also beyond the standard distribution on the scale.

Least Preferred Color Group II

$n = 76$
25 changed
$p = 25/76 = .3289$

$$z = \frac{.3289 - .10}{\sqrt{\frac{(.10)(.90)}{76}}} = \frac{.2289}{.0344} = 6.6540$$

The most significant change in least color preference is again noted in the result 6.6540 of the test given to the second group.

Least Preferred Color Group III

$n = 101$
26 changed
$p = 26/101 = .1574$

$$z = \frac{.2574 - .10}{\sqrt{\frac{(.10)(.90)}{101}}} = \frac{.1574}{.02985} = 5.2730$$

The number 5.2730 on the scale z occurs outside the critical range. This result shows significant color changes.

The calculations for the three groups of z can be readily seen by a quick glance at Table VIII.

TABLE VIII

CHANGES IN COLOR PREFERENCE ON THE SCALE

PREFERRED COLOR		LEAST PREFERRED COLOR	
Grade	Scale	Grade	Scale
One	6.9088	One	4.9573
Two	8.9505	Two	6.6540
Three	2.2881	Three	5.2730

The significant level on the z scale is 1.645.

Since the calculated numbers of the test for measuring A proportion (p) for the three grades were significant above the level 1.645, the

null hypothesis must be rejected. The accepted alternative hypothesis is: The environmental color structure has an effect on elementary children's preference of color from grade one to three. Table VIII would suggest that children who have been exposed to the environmental color structure reflect the exposure in the color preference.

CHAPTER V

CONCLUSION, RECOMMENDATIONS AND SUMMARY

Review of the Study

The main purpose of this study was to investigate the influences the environmental color structures would have on elementary children's preference of colors. Two hundred and fifty elementary children were exposed to stimulation that would involve the six sensitizing systems. These six systems were the following: visual, auditory, gustatory, tactile, olfactory, and kinesthetic.

Conclusions

Based upon the statistical analysis collected in the research, the following conclusions may be drawn:

(1) Environmental color structure, as used in this research, did have an influence on the preference of color of children who are in elementary grades one, two, and three.

(2) Statistical data showed that the results of the experiment are outside the range of random occurrence.

(3) The results of the research and the literature reviewed indicated that art teachers should make use of all approaches of sensory motivations in the classroom.

Factors that seemed to affect the study

Several factors could have caused the findings of the experimental test to vary. There are certain weaknesses in this research that have come to light since the experimental results have been

obtained.

(1) The researcher felt that the amount of time allowed in the environmental color structure was insufficient because the children wanted to stay inside the structure for a longer period of time. Being allowed only a limited amount of time, each child was not able to fully explore and evaluate his immersion in a total-color environment.

(2) Another notable factor was that the test was administered to a group and not to each individual child. This could have had a bearing on an individual's selection of color.

(3) The researcher selected for this study the children she had taught. Earlier in the school year the researcher had tried different color approaches; therefore, the children perhaps already had established their own color schema.

Recommendations for further study

The scope of this study was narrow with regard to the design element color and the age level involved. In particular, additional research in color sensitizing is needed on the upper primary and secondary levels. The following general areas are proposed for further study.

(1) A more extensive study on the influences that the color environmental structures would have over a longer period of time. This would observe the growth of the children and the effects of prolonged sensitizing stimulation.

(2) A study on the correlation between the number of items a child can name and his preference of color.

(3) A more thorough investigation of the particular effect that sensory experiences would have on the schema in children's art.

(4) A comparison of similarities and differences between the sexes in their preference of colors should be studied. This comparison could be done on all grade levels in the elementary school. Tables XIII, XIV, XV, and XVI in Appendix D exemplifies a comparison.

Summary

One of the objectives of art education for the elementary child is to develop his artistic and perceptual awareness. This objective is to enhance the child's awareness and understanding of his environment through the development of his sensory system. An important part of the total art experience is cultivation and growth of the sensitization system.

The approach used in this experimental study appeared to the researcher to have considerable potential for tomorrow's education. A style of multi-sensory open-end art instruction which will motivate the child to involve all his sensitizing systems should prove to create a more effective learning process. This type of child-centered experiences is highly individualized; it takes into account that all children are different and they learn in different ways. This approach releases the child's learning potential by putting learning where it belongs within the active participation of the individual.

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APPENDIX A

TESTING INSTRUMENT

Name _____

Age _____ Grade _____

Girl _____ Boy _____

Teacher _____

I like best

_____

Yellow _____

Green _____

Blue _____

Red _____

Things I can name

Throw away one color

_____

Yellow _____

Green _____

Blue _____

Red _____

Things I can name

APPENDIX B

MOTIVATIONAL AND STIMULI MATERIAL

IN THE COLOR ENVIRONMENTAL STRUCTURES

COLOR MOTIVATION DIALOGUE BEFORE

COLOR ENVIRONMENT

Stop!!! Slow down!!! Take a careful look around you..... What do you see?.....What do you really see in full color?..... Sometimes, we are so busy existing that we forget to take time to devote our attention to our existence. We are so busy that we block out many things. Even the darkest areas have some color, if you take a close look. Take a fresh look at everyday experiences instead of taking them for granted. Get out of your world of grays. Join the delightful color-bunch. Observe the subtle and almost infinite range of colors so generally taken for nothing. Who has on red?.....Who has on blue?.....Who has on green?.....Who has on yellow? What do you think it would be like to enter a world of just one color? How do you think that color would sound? How do you think it would smell? How do you think that color would taste? How do you think color would feel on your fingers?

Environmental Color Structures

The environmental color structures were four self-contained four-foot cubes, each painted with one of four colors. The cubes' own particular color were either all yellow, all blue, all green, or all red. Each environmental color structures were saturated with stimula for the six sensitizing systems. This stimuli always corresponded with the same color in the cube. Visually, they contained objects of various textures; many of these objects were movable. Tapes of appropriate music and poetry were played in the background. An aroma of different smells pertinent to each environment floated throughout the cube. Every environmental color structure contained candy to be tasted.

A circle opening in the front of the environmental structure allowed one child at a time to enter his own private and intimate color world. To further enhance this awareness, a soft electric light emitted a glow of the same color throughout the environmental structure.

TABLE IX

Stimuli in the Yellow Environmental Color Structure

Stimuli	Sensitizing Systems					
	Visual	Auditory	Gustatory	Tactile	Olfactory	Kinesthetic
Shag Rug	*			*		*
Straw Flower	*			*		*
Rose Decal	*			*		*
Blow Fish	*			*		*
Wicker Chain	*			*		*
Plastic Duck Mat	*			*		*
Satin Material	*			*		*
Terry Cloth Material	*			*		*
Spool of Yarn	*			*		*
Plastic Lemon	*			*		*
Straw Basket	*			*		*
Toy Noise Maker	*			*		*
Toy Squeeze Animal	*	*		*		*
Plastic Tiger	*			*		*
Stuffed Egg Man	*			*		*
Ball Reflector	*			*		*
Plastic Sun Glasses	*			*		*
Crayon Candle	*			*		*
Toliet Paper Roll	*			*		*
Bean Bag Frog	*			*		*
Lion Puppet	*			*		*
Writing Paper	*			*		*
Cloth Ball Cap	*			*		*
Plush Pillow	*			*		*
Leather Pillow	*			*		*
Corduroy Pillow	*			*		*
Satin Pillow	*			*		*
Plastic Lei	*			*		*
Glass Jar	*			*		*
Hanging Soap Dish	*			*		*
Straw Hat	*			*		*

* The sensitizing system that was used is noted by an asterisk

Table IX (Continued)

Stimuli	Sensitizing Systems					
	Visual	Auditory	Gustatory	Tactile	Olfactory	Kinesthetic
Chiffon	*			*		*
Paper Towel Roll	*			*		*
Ballpoint Pen	*			*		*
Tuff Carpet	*			*		*
Cord Rug	*			*		*
String of Tuff Balls	*			*		*
Plastic Hat	*			*		*
Feather Stick	*			*		*
Wooden Ladybug	*			*		*
Straw Basket	*			*		*
Yo-Yo	*			*		*
Duck Mobile	*			*		*
Crepe Paper	*			*		
Painted Wall	*			*		
Corrugated Paper	*			*		
Butterscotch Candy	*		*	*		*
Quilted Rug	*			*		*
Music		*				
Soap	*			*	*	*
Paper Lantern	*					
Pineapple Incense					*	
Lemon Kool-Aid	*		*	*		*

* The sensitizing system that was used is noted by an asterisk

TABLE X

Stimuli in the Green Environmental Color Structure

Stimuli	Sensitizing Systems					
	Visual	Auditory	Gustatory	Tactile	Olfactory	Kinesthetic
Raffia	*			*		*
Glass Wind Chimes	*	*		*		*
Shag Pillow	*			*		*
Straw Flower	*			*		*
Toy Rubber Aligator	*			*		*
Paper Towel Roll	*			*		*
Toliet Paper Roll	*			*		*
Three Mirrors	*			*		*
Paper Sea Horses	*			*		*
Plastic Hat	*			*		*
Plastic Sun Glasses	*			*		*
Plastic Football	*			*		*
Plastic Cucumbers	*			*		*
Wooden Bug	*			*		*
Plastic Limes	*			*		*
Yo-Yo	*			*		*
Toy Frisbee	*			*		*
Soap	*			*	*	*
Painted Wall	*			*		*
Woven Mat Material	*			*		*
Fluffy Material	*			*		*
Quilted Material	*			*		*
Chiffon Material	*			*		*
Tuff Carpet	*			*		*
Fish Net	*			*		*
Ball Reflector	*			*		*
Wooden Toy Top	*			*		*
Coral	*			*		*
Felt Box	*			*		*
Glass Bottle	*			*		*
Sheepskin Rug	*			*		*
Squeeze Toy	*			*		*

* The sensitizing system that was used is noted by an asterisk

Table X (Continued)

Stimuli	Sensitizing Systems					
	Visual	Auditory	Gustatory	Tactile	Olfactory	Kinesthetic
Wooden Toy Ball Catch	*			*		*
Reed Chain	*			*		*
Whistle	*	*		*		*
Woven Basket	*			*		*
Velour Paper	*			*		*
Corrugated Paper	*			*		
Writing Paper	*			*		*
Ball Point Pen	*			*		*
Frog Mat	*			*		*
Toy Tools	*			*		*
Leather Material	*			*		*
Lime Candy	*		*	*		*
Paper Lantern	*					
Music		*				
Lime Kool-aid	*		*	*		*
Pine Incense					*	

* The sensitizing system that was used is noted by an asterisk

TABLE XI

Stimuli in the Red Environmental Color Structure

Stimuli	Sensitizing Systems					
	Visual	Auditory	Gustatory	Tactile	Olfactory	Kinesthetic
Tuff Carpet	*			*		*
Shag Carpet	*			*		*
Painted Wall	*			*		
Plastic Fireman Hat	*			*		*
Wooden Pencil	*			*		*
Paper Lantern	*					
Toy Noise Maker	*	*				
Velveteen Pillow	*			*		*
Satin Pillow	*			*		*
Strawberry Mat	*			*		*
Rubber Ball	*			*		*
Bean Bag Chair	*			*		*
Wooden Mexican Chair	*			*		*
Plastic Cherries	*			*		*
Elephant Paper Weight	*			*		*
Mixed Cookie Cutters	*			*		*
Glass Jar	*			*		*
Music Shackers	*	*		*		*
Toy Fish	*	*		*		*
Toy Bird	*			*		*
Reed Butterfly	*			*		*
Paper Lei	*			*		*
Reed Basket	*			*		*
Glass Beads	*			*		*
Mirror Mobile	*					
Wood Wind Chimes	*	*		*		*
Toy Puppet Man	*			*		*
Toy Plastic Tools	*			*		*
Bear Decal	*			*		*
Flower Decal	*			*		*
Strawberry Decal	*			*		*

* The sensitizing system that was used is noted by an asterisk

Table XI (Continued)

Stimuli	Sensitizing Systems					
	Visual	Auditory	Gustatory	Tactile	Olfactory	Kinesthetic
Burlap Material	*			*		*
Cotton Material	*			*		*
Corrugated Paper	*			*		*
Shinny Paper	*			*		*
Writing Paper	*			*		*
Music		*				
Toilet Tissue	*			*		*
Plastic Sun Glasses	*			*		*
Plastic Telephone	*			*		*
Raffia	*			*		*
Watermelon Candy	*		*	*		*
Strawberry Incense					*	
Toy Noise Maker	*	*		*		*
Cherry Kool-aid			*			

* The sensitizing system that was used is noted by an asterisk

TABLE XII

Stimuli in the Blue Environmental Color Structure

Stimuli	Sensitizing Systems					
	Visual	Auditory	Gustatory	Tactile	Olfactory	Kinesthetic
Satin Pillow	*			*		*
Linen Pillow	*			*		*
Velvet Pillow	*			*		*
Feather Stick	*			*		*
Tuff Throw Rug	*			*		*
Painted Wall	*			*		*
Mirror Mobile	*			*		*
Writing Paper	*			*		*
Tissue Paper Pinata	*			*		*
Plastic Lei	*			*		*
Toilet Tissue	*			*		*
Paper Towel Roll	*			*		*
Straw Flower	*			*		*
Woven Flower Mat	*			*		
Striped Rug	*			*		
Ball Reflector	*			*		*
Woven Straw Hatchet	*			*		*
Terry Cloth Material	*			*		
Velour Paper	*			*		
Toy Noise Maker	*	*		*		*
Wooden Castanets	*	*		*		*
Fluffy Pile Material	*			*		
Owl-shaped Stapler	*			*		*
Reed Butterfly	*			*		*
Stuffed Toy Seal	*			*		*
Shag Rug	*			*		*
Plastic Sun Glasses	*			*		*
Kaleidoscope	*			*		*
Knitted Material	*			*		
Leather Material	*			*		
Fringe	*			*		

* The sensitizing system that was used is noted in the table by an asterisk

Table XII (Continued)

Stimuli	Sensitizing Systems					
	Visual	Auditory	Gustatory	Tactile	Olfactory	Kinesthetic
Straw Basket	*			*		*
Hanging Glass Dish	*			*		
Woven Swing	*			*		*
Mint Candy	*		*			
Paper Lantern	*					
Music	*					
Ball Point Pen	*			*		*
Crepe Paper	*			*		
Foil Paper	*			*		
Blueberry Incense					*	
Grape Kool-aid	*		*	*		*

* The sensitizing system that was used is noted in the table by an asterisk

APPENDIX C

EXCERPTS FROM THE RESPONSES OF THE CHILDREN

Yellow

My little brother has a blanket.

Yellow is bad.

Yellow is so bright.

Girls hare becus it is ogly.

Yuky and ugly.

I don't like yellow butter on my taste.

It makes me sad and not nice.

Vary fun, vary vary good. Yay. Good.

Box.

Yuck.

Yucky and sick.

I hate yellow becuse it dsent show up.

It looks so bright it makes me fill dum.

Yach.

Like a ghost.

Besse.

It makes me feel light.

Yellow made me feel founny.

Yellow makes me feel sad and stuped.

Crumy! Crumy! Yellow makes me feel Crumy.

Ugly gushy mashy.

Green

Grass is not green in our yard.

Green frog with yellow spots.

A tree I like to climb tree.

Green (cont'd)

It is the color of grass and I don't like the grass because it is itge.

Wonder life.

It makes me feel ugle and stoped.

Green makes me feil sour.

I like green because its nature.

It makes me sticky.

Green makes me feel dull and old.

It makes me sleepy.

Blue

Close color to the purple.

It is pretty like the sky.

Because it is the color of the lake.

Some wedows.

Blue is a shoe that has blue in it.

Groove.

My eyes are blue.

I like its bright and beautiful.

Night is blue.

I do not like sand or blueberries.

It makes me feel free and happy.

I always tar my blue shirt.

Blue make me be nice.

Red

Calling for a flag for my friends to play with me.

I like red because it is like fire.

Red (cont'd)

Nice-sweet-lovebul.

Dam Bat.

I like red sort of.

Out of sight.

I feel bad ugly. It makes my look dumb.

Red is pretty as a big red bear.

I can name a red shirt it make me fell happy.

Stripes on the flag.

Make me silly in it.

APPENDIX D

DATA

TABLE XIII

Pre-test Preferred Color Selection

Color	Group I				Group II				Group III			
	G	B	T	%	G	B	T	%	G	B	T	%
Yellow	6	3	9	12	7	5	12	16	5	7	12	12
Green	5	7	12	16	9	4	13	17	5	10	15	15
Blue	13	16	29	39	13	8	21	28	23	17	40	40
Red	8	15	23	33	9	21	30	39	14	20	34	33
Total	32	41	73		38	38	76		47	54	101	

G-represents girls. B-represents boys. T-represents total.

TABLE XIV

Pre-test Least Preferred Color Selection

Color	Group I				Group II				Group III			
	G	B	T	%	G	B	T	%	G	B	T	%
Yellow	12	24	36	49	10	25	35	46	17	29	46	45
Green	14	4	18	25	6	6	12	16	19	15	34	34
Blue	3	7	10	14	11	3	14	18	5	2	7	7
Red	3	6	9	12	11	4	15	20	6	8	14	14
Total	32	41	73		38	38	76		47	54	101	

G-represents girls. B-represents boys. T-represents total.

TABLE XV

Post-test Preferred Color Selection

Color	Group I				Group II				Group III			
	G	B	T	%	G	B	T	%	G	B	T	%
Yellow	4	3	7	10	4	2	6	8	5	8	13	13
Green	3	6	9	12	4	7	11	14	3	9	12	12
Blue	10	17	27	37	16	9	25	33	27	18	45	44
Red	15	15	30	41	14	20	34	45	12	19	31	31
Total	32	41	73		38	38	76		47	54	101	

G-represents girls. B-represents boys. T-represents total.

TABLE XVI

Post-test Least Preferred Color Selection

Color	Group I				Group II				Group III			
	G	B	T	%	G	B	T	%	G	B	T	%
Yellow	16	21	37	51	20	24	44	58	15	30	45	44
Green	12	5	17	23	11	7	18	24	20	15	35	35
Blue	2	7	9	12	4	5	9	12	4	3	7	7
Red	2	8	10	14	3	2	5	6	8	6	14	14
Total	32	41	73		38	38	76		47	54	101	

G-represents girls. B-represents boys. T-represents total.

TABLE XVII

COLOR ASSOCIATION AND VOCABULARY INVENTORY SUPPLIED BY RESEARCHER

Group I												
Colors	Yellow			Green			Blue			Red		
Sex	G	B	T	G	B	T	G	B	T	G	B	T
Soft	12	19	31	16	13	29	12	14	26	10	11	21
Hard	7	3	10	6	6	12	8	4	12	9	9	18
Shiny	15	15	30	10	10	20	11	13	24	11	16	27
Sunny	11	16	27	10	10	20	10	7	17	19	14	33
Smooth	13	14	27	9	9	18	11	14	25	10	11	21
Fuzzy	11	18	29	14	16	30	19	11	30	8	16	24
Warm	7	16	23	7	10	17	20	10	30	6	10	16
Cool	11	7	18	8	7	5	10	8	18	10	9	10
Fluffy	13	15	28	13	17	30	13	15	28	10	17	27
Furry	6	7	13	6	10	16	9	14	23	6	10	16
Joyful	9	13	22	11	8	19	9	16	25	12	13	25
Cold	5	9	14	8	5	13	5	4	9	4	5	9
Yes	1	6	7	1	3	4	4	0	4	0	1	1
Singout	9	9	18	11	9	20	10	12	22	6	15	31
Squeeze	13	17	30	16	9	35	13	14	27	18	5	23

G-represents number of girls out of 32. B-represents number of boys out of 41.
T- represents total number of in group (73).

TABLE XVIII

COLOR ASSOCIATION AND VOCABULARY INVENTORY SUPPLIED BY RESEARCHER

Group II												
Colors	Yellow			Green			Blue			Red		
Sex	G	B	T	G	B	T	G	B	T	G	B	T
Soft	27	27	54	31	30	61	25	25	50	28	28	56
Hard	4	5	9	10	7	17	4	8	12	5	10	15
Shiny	22	22	44	18	15	33	14	18	32	24	22	46
Sunny	20	22	42	16	12	28	12	11	23	11	15	26
Smooth	17	22	39	23	25	48	16	23	39	20	21	41
Fuzzy	20	23	43	24	27	51	15	26	41	19	20	39
Warm	23	21	44	18	26	44	20	28	48	24	22	46
Cool	8	14	22	20	17	37	16	16	32	18	16	34
Fluffy	23	22	45	21	24	45	19	19	38	19	22	41
Furry	14	7	21	16	17	33	20	17	37	18	9	27
Joyful	19	25	44	23	21	44	24	25	49	25	25	50
Cold	4	5	9	10	3	13	4	9	13	4	2	6
Yes	2	4	6	15	6	21	2	5	7	5	0	5
Singout	12	13	25	13	14	27	11	14	25	7	10	17
Squeeze	14	14	28	9	14	23	15	14	29	15	15	33

G-represents number of girls out of 38 total. B-represents number of boys out of 38. T-represents total number of in group (76).

TABLE XIX

COLOR ASSOCIATION AND VOCABULARY INVENTORY SUPPLIED BY RESEARCHER

Group III												
Colors	Yellow			Green			Blue			Red		
Sex	G	B	T	G	B	T	G	B	T	G	B	T
Soft	32	25	57	35	28	63	25	21	46	34	27	61
Hard	12	13	25	17	19	36	16	14	30	13	14	27
Shiny	26	22	48	28	26	54	24	13	37	33	20	53
Sunny	26	31	47	18	11	29	15	8	23	23	13	36
Smooth	25	23	48	25	27	52	24	19	43	31	19	50
Fuzzy	24	28	52	19	30	49	22	22	44	26	19	45
Warm	21	20	41	23	18	41	27	22	49	28	22	50
Cool	11	12	23	18	14	32	12	17	29	11	21	32
Fluffy	32	23	55	21	26	47	25	16	41	22	23	25
Furry	13	13	26	25	15	40	17	15	32	19	7	26
Joyful	31	25	56	8	26	26	17	23	40	24	24	46
Cold	5	8	13	20	4	12	5	11	16	10	11	21
Yes	6	3	9	8	7	15	10	5	15	9	5	14
Singout	21	16	37	16	22	38	15	12	21	23	16	39
Squeeze	26	16	42	20	19	39	19	14	33	26	16	42

G-represents number of girls out of 47 total. B-represents number of boys out of 54 total. T-represents total number in group (101).

TABLE XX

COLOR IMPRESSION AND INVENTORY SUPPLIED BY CHILDREN

Preferred Color							
*	Yellow	*	Green	*	Blue	*	Red
7	No Response	8	No Response	12	No Response	11	No Response
7	Happy	11	Happy	18	Happy	37	Happy
3	Hot	6	Good	11	Good	10	Hot
2	Good	2	Big	4	Pretty	4	Good
2	Bright	1	Fresh	4	Funny	3	Nice
2	Nice	1	Pretty	4	Cool	2	Good
1	Sunny	1	Bold	3	Fine	2	Glad
1	Mad	1	Wonderful	2	Exciting	2	Pretty
1	Swimming pool	1	Glad	2	Hot	2	Cool
		1	Gay	1	Not very good	2	Fine
		1	Joyful	1	Handsome	2	Sad
		1	Like	1	Fun	2	Funny
		1	Sad	1	Pleasant	1	Dumb
				1	Perfect	1	Cold
				1	Groovy	1	Girlish
				1	Like a woman	1	Normal
				1	Great	1	Bloody
				1	Close	1	Handsome
				1	Nice	1	Light
				1	Like	1	Dark
				1	Cool	1	Boy
33		40		90		87	

* The number of responses are noted in the column under each asterisk. Y = yellow G = green B = blue R = red

TABLE XXI

COLOR IMPRESSION AND INVENTORY SUPPLIED BY CHILDREN

Least Preferred Color							
*	Yellow	*	Green	*	Blue	*	Red
7	No Response	9	No Response	4	No Response	3	No Response
11	Sad	7	Bad	5	Sad	9	Sad
8	Bad	4	Happy	4	Bad	3	Terrible
8	Terrible	4	Mad	3	Mad	5	Mad
8	Mad	2	Gloomy	2	Terrible	2	Happy
4	Ugly	2	Sick	1	Stupid	2	Hot
4	Dumb	3	Unhappy	1	Funny	2	Stupid
3	Sick	2	Glad	1	Sick	2	Sick
3	Awful	2	Terrible	1	Cry	2	Hate
3	Stupid	2	Mad	1	Groggy	1	Bad
3	Unhappy	2	Horrible	1	Unhappy	1	Dumb
2	Hot	1	Picky	1	Cross	1	Good
2	Good	1	Rough	1	Don't like	1	Fire
2	Not good	1	Dumb	1	Ugly	1	Gloomy
2	Hate	2	Hate	1	Dark	1	Dull
1	Dislike	1	Very cold	1	Dumb	1	Horrible
1	Icky	1	Not so good			1	Sad
1	Sun	1	Queer			1	Silly
1	Eerie	1	Unhappy			1	Dizzy
1	Sad Face	1	Grassy			1	Cool
1	Blah	1	Sicky				
1	Question	1	Mean				
1	Silly						
1	Sleepy						
1	Not pretty						
1	Like a ghost						
116		48		35		44	

* The number of responses are noted in the column under each asterisk. Y = yellow G = green B = blue R = red

TABLE XXII

MEAN NUMBER OF OBJECTS NAMED IN COLOR SELECTION

Preferred Color

Group	I				II				III			
Color	Y	G	B	R	Y	G	B	R	Y	G	B	R
Pre-test	4.4	2.0	2.8	2.1	.9	1.2	.4	.8	3.6	3.2	2.8	3.2
Post-test	5.4	3.2	2.6	2.9	1.2	1.7	2.0	2.9	3.6	4.5	4.4	4.4
Change	1.0	1.2	.2	.8	.3	.5	1.6	2.1	.0	1.3	2.6	1.2

Y-represents yellow. G-represents green. B-represents blue. R-represents red.

TABLE XXIII

MEAN NUMBER OF OBJECTS NAMED IN COLOR SELECTION

Least Preferred Color

Group	I				II				III			
Color	Y	G	B	R	Y	G	B	R	Y	G	B	R
Pre-test	1.5	2.2	1.9	1.9	.8	.5	.5	.6	1.3	2.2	1.9	1.1
Post-test	1.9	2.2	2.9	2.5	2.3	1.9	3.0	1.3	1.4	5.0	3.1	2.9
Change	.4	.0	1.0	.6	1.5	1.4	2.5	.7	.1	2.8	1.3	1.8

Y-represents yellow. G-represents green. B-represents blue. R-represents red.

APPENDIX E

PHOTOGRAPHS OF ENVIRONMENTAL COLOR STRUCTURES

PLATE I

Looking straight into the Yellow Environmental Structure

Looking down into the Yellow Environmental Structure

PLATE II

Looking through the entrance of the Blue Environmental Structure

Looking down into the Blue Environmental Structure

PLATE III

Looking through the entrance of the Green Environmental Structure

Looking down into the Green Environmental Structure

PLATE IV

Looking straight into the Red Environmental Structure

Looking down into the Red Environmental Structure