

**AN APPROACH TO TEACHING CHILDREN ABOUT  
THE AESTHETICS OF PLANTS AND GARDENS**

**BY**

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**A thesis submitted to the Faculty of the University of Delaware in partial  
fulfillment of the requirements for the degree of Master of Science in Ornamental Horticulture.**

**June, 1976**

## ACKNOWLEDGEMENTS

The author would like to thank the Longwood Program in Ornamental Horticulture for the Graduate Fellowship which has made the preparation of this thesis possible. I would also like to thank all those persons who were helpful in offering information pertaining to the subject of this thesis.

I am very grateful to Mr. Harold Bruce, Dr. Donald Huttleston, and Dr. Richard Lighty, who have served on my thesis committee and whose guidance, counsel, and criticism have improved this thesis. I especially want to thank my wife Carol for her help and patience during the last two years and my Grandmother, Elizabeth Ribley, whose encouragement and guidance at an early age led me into horticulture.

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## ABSTRACT

The point of this thesis is to draw together some ideas which may serve as guidelines for those who are interested in a program for the education of children in gardens. An education program should not consist only of the courses of plant study and practical gardening, but also the encouragement of sensitivity to beauty, or aesthetics. Any program must consider not only the qualifications of the teacher to teach aesthetics and the ability of the student to understand aesthetics, but the methods used to present the material.

The teacher's role is one of training and guiding the child's interest in the proper direction. The teacher needs to inform himself by knowing how children learn, the pupil's age and maturation level, their motivation, their known and perceived needs, the physical conditions and time factor, and the child's interest. The teacher must be conversant in the topic and utilize the child's interest as a point of beginning, not as the exclusive direction.

The student's role should be an active one. In teaching aesthetics the interest of the child can be maintained if the instructor moves quickly into the various phases of each topic, touching only on the most important points and allowing the pupils to build on them.

In order to learn aesthetics it is necessary for the child to understand the elements of color, texture, and form and their interrelationships. This involves the handling of more than one variable, the forming of hypotheses and the evolution of logical conclusions. In the intellectual development of a child this ability generally becomes evident in the eleven to fifteen year age group. Therefore aesthetics of plants and gardens are best taught to children in grades four to six.

When teaching aesthetics of plants and gardens, it is important for the student to understand the concepts of diversity, interrelationships, adaptation and change. These concepts can be further interpreted through the study of the aesthetic elements of color, texture, and form. When teaching these elements, the instructor is encouraged to use the methods and

materials the teacher feels confident with and teaching in an interesting and informative manner, it is hoped that both the teacher and the pupil will realize that beauty is in the study, the acquiring of perception, the self satisfaction, the creating process.

## INTRODUCTION

In 1929 C. Stuart Gager, the first director of the Brooklyn Botanic Garden, stated that “. . . education by and large, is the most important function of civilized society.”<sup>1</sup> It is significant to note that over forty years had to pass before the public garden community, as a whole, took this message to heart. Gardens have not only educational potential, but as Julia Berrall points out, they have the unique ability to offer “delight and refreshment of mind”<sup>2</sup> to those who make use of them.

This thesis was begun to draw together some ideas which will serve as guidelines for those who are interested in the education of children in gardens. It is hoped that this thesis will serve to encourage others to elaborate and refine their individual approaches and realize that the garden, as one of the most complicated and sophisticated art forms, has, as Gertrude Jekyll stated, the ability “to soothe, to refine, and lift up the heart in a spirit of praise and thankfulness.”<sup>3</sup>

## CHAPTER I

### HISTORY OF GARDENING AND GARDENING EDUCATION

In order to study the aesthetics of plants and gardens, it is necessary to realize that gardening is one of the most complex of the arts because it deals not only with a multiplicity of elements at one time, but also deals with time itself. A garden is influenced and changed by the same forces which affect painting, sculpture, music, and all other art forms. Changes also occur as the sun crosses the sky, as the seasons change, or as a part of the garden bursts into bloom or fades into the background. The garden designer who deals with this complexity must be an artist of great ability.

While gardens have evolved in a similar fashion to the other arts, and have been influenced by some of the same trends during their development, they are uniquely suited to recreational and avocational use by people from all levels of society. Gardens were the playthings of kings in classical times and the delight of the sacred and secular nobility during the Renaissance. During the last century they became one of the truly universal art forms, available to rich and poor, old and young alike.

Through their development, gardens have performed a valuable function in education. Schools of gardening had been conducted in ancient times, but chiefly for boys of noble birth.<sup>4</sup> By the Middle Ages the love of beauty and curiosity increased the demand for horticulturists.<sup>5</sup> At the beginning of the 17th century, German universities started botanical gardens, and by the 18th century formalized botanical training was taught by monks.<sup>6</sup> During the 19th century gardening as an educational activity began in the European German States.<sup>7</sup> Many owners of large estates instituted gardens or farms for the instruction of their employees.<sup>8</sup> From this practice a few private schools developed.<sup>9</sup> These schools offered courses covering three or four years work to children over the age of fourteen, usually the sons and daughters of farmers or estate laborers.<sup>10</sup> Eventually the various governments became interested in these gardening schools and the feeling arose that something should be

done to give rural school children instruction in the use of their environment.<sup>11</sup> This movement became known as school gardening.<sup>12</sup>

At Schleswig-Holstein, Germany, in 1814, Nassau in 1817 and in Prussia in 1819, school gardening, stressing agricultural results, was introduced into rural schools.<sup>13</sup> This necessitated careful training of teachers for garden work, and they logically carried plant study, as a feature, into the elementary and secondary city schools.<sup>14</sup> With the founding in 1840 of Froebel's "school of happy occupations," or Kindergarten, the philosophy of the school gardening movement began to change.<sup>15</sup> By the late 19th century the School Gardening Movement was no longer just stressing agricultural results for the administrators began to feel that school gardening "sharpens the powers of observation."<sup>16</sup>

In 1869 the governments of Sweden and Austria both issued royal edicts concerning school gardens.<sup>17</sup> The Austrian Ministry of Education stated that gardens and areas for agricultural experimentation must be established wherever practical.<sup>18</sup> The government of Sweden required every school to have a garden of 70-150 square yards.<sup>19</sup> At this same time the Belgian government introduced into all its schools a compulsory course in horticulture, emphasizing truck farming, which was then the prominent occupation of that country.<sup>20</sup>

In 1880, France, by order of the French Ministry of Education, set up a school gardening curriculum in its elementary schools.<sup>21</sup> The Ministry stressed that the purpose was not to teach farming but to instill a love of the country and develop interests in nature.<sup>22</sup> Unfortunately this did not become universal in practice until 1902. In the same year, 1880, Russia, like France, decreed that any school receiving public funds must provide a garden for flowers and vegetables, an orchard, a plot for forest trees, and an apiary.<sup>23</sup> In addition the government provided summer courses for teachers, free seeds, for the schools' gardens, and traveling instructors who were sent to all schools to make sure that the courses were well planned and the gardens properly laid out.<sup>24</sup>

The initial step to establish school gardens in the United States was made by the Massachusetts Horticultural Society which, in 1890, sent Mr. Henry L. Clapp to study the school gardens of Europe.<sup>25</sup> In 1891 Clapp instituted the first school garden in America, a wildflower garden, at The George Putnam School in Roxbury, Massachusetts.<sup>26</sup>



In England, the school gardening movement was connected with what we call private education until about 1900.<sup>27</sup> Gardening was offered as a public education curriculum option beginning in 1895, but from 1902-1904 it was finally made mandatory in all rural schools.<sup>28</sup> In the spring of 1904 several school gardens were established in the provinces of Canada, and by 1910 had served as examples for other similar programs.<sup>29</sup> The movement continued to grow with gardening as an educational activity reaching its peak in 1916.<sup>30</sup>

With the advent of World War I school gardening efforts were channeled into food production.<sup>31</sup> After the war the public no longer had interest in the educational possibilities of school gardens. Their interest in the school garden as a means of food production was no longer necessary and alternative uses and benefits of the garden had been lost sight of.<sup>32</sup> With the depression, gardens were again looked to for food production and this was further reinforced with the advent of Victory Gardens during World War II. After the end of the war the new technological advances brought about a decline in the interest in school gardens and eventually the end of widespread school gardens.

Although interest in school gardens began to decline during the second decade of this century, education in Botanic Gardens began to become more important. This importance was emphasized by C. Stuart Gager, first director of The Brooklyn Botanic Garden, when he stated in 1910 that,

public education is the most important activity in which a botanic garden can engage, just as education, by and large, is the most important function of civilized society. Knowledge is power only when put into circulation, otherwise it is only potential energy producing no results.<sup>33</sup>

He further pointed out that "we have in a botanic garden an educational instrument unique in kind and not surpassed in importance by any educational equipment."<sup>34</sup>

Gager not only recommended the courses of plant study and practical gardening, but also the encouragement of sensitivity to beauty, or aesthetics,<sup>35</sup> for he stated that

beauty itself is an educational force not second by any means to knowledge of structure, function, and relationships. A botanic garden, therefore, should exemplify in its plantings the utilization of plants for aesthetic effect.<sup>36</sup>

## FOOTNOTES CHAPTER I

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## CHAPTER II

### TEACHING AESTHETICS

In order for a Botanic Garden to utilize both the aesthetics of its plantings and the aesthetics of individual plants in its education program, it must have a program which can convey the aesthetic ideas in an interesting, yet informative manner. The program must consider not only the qualifications of the teacher to teach aesthetics and the ability of the student to understand aesthetics, but the methods used to present the material. "The greatest danger is that of making the work too complete, too rigid, and too formidable."<sup>1</sup>

#### The Teacher

The teacher's role is one of training and guiding the child's curiosity and interest in the proper direction. The basic underlying idea is to train, not to teach. The teacher must train the student "to observe in order to acquire a correctness of perception, for education amongst us consists too much in telling and not enough in training."<sup>2</sup> The powers of observation are very necessary, for "the more a person is trained to observe and reflect, the more sensitive his mind becomes to the things around him."<sup>3</sup>

The teacher "needs to inform himself (about the pupil) before he informs the pupil."<sup>4</sup> Part of the task of informing himself is to know how children learn, the pupil's background and experience, their age and maturation level, their motivation, their known and perceived needs, the physical conditions, the time factor involved, and the child's interest.<sup>5</sup>

Interest is a very important factor affecting not only the quantity of learning, but also the quality. The teacher can almost always capitalize on the child's interest. For this to be possible, the teacher must be conversant in the topic and utilize the child's interest as a point of beginning, not as the exclusive direction.<sup>6</sup>

The teacher must be accurate in all he is doing for "accuracy is truth and develops

power,"<sup>7</sup> but the teacher cannot expect the pupil "to be really interested until he (the teacher) sees accurately and reasons correctly."<sup>8</sup> Once the teacher becomes accurate and is able to observe, he should become sensitive to the following:

1. Evidence of the child's interest.
2. Evidence of the child's reasoning, both inductive and deductive.
3. Evidence of understanding of the information presented.
4. Evidence of the child's ability to generalize.
5. Use of the children's questions to further class discussion and the learning objectives.

This sensitivity together with a conscientious effort to avoid excessive verbalization by using first-hand demonstrations will aid the teacher in developing a useable teaching program.

### The Student

Many institutions have emphasized children's education and gardening programs because children may be the most receptive to the benefits of horticulture. We realize that "gardening is one of the few creative and constructive activities which we have to offer to the young."<sup>9</sup> One of the benefits of education through gardening is that gardening develops a "close cooperation of physical and mental work and fosters the capacity of concentration."<sup>10</sup>

To see how learning the aesthetics of plants and gardens can benefit the mental development of the child, it is necessary to see how his mental processes develop. It is also necessary to see how this development affects his ability to understand the elements of color, texture and form which are basic to the teaching of the aesthetics of plants and gardens.

As the child's intellect develops during the years from birth to fifteen, he moves through various phases. This development, which refers to change that occurs through time, will be looked at in four age groups, birth to two, two to seven, seven to eleven, and eleven to fifteen.

#### Birth to two.

As the child's intellect develops during the first two years of his life, his activities are dominated by the physical attributes of the environment. The child is developing and learning to coordinate his motor reflexes, for example reaching for an object and bringing it to his

mouth.<sup>12</sup> This coordination offers some basis for him to respond to the environment, and to develop a differentiation of himself from objects.<sup>13</sup>

Children in this age group also begin to react to other characteristics of objects, namely color and form. It has been shown that infants younger than six months show preference for visual patterns, especially those utilizing color or color patterns.<sup>14</sup> One report (Mann and Steinung, 1931) reported that children as young as six weeks could differentiate form.<sup>15</sup> This is visual form using patterns, not objects. The earliest age for differentiation of object form is fifteen months.<sup>16</sup>

The child from birth to two can therefore respond to both color and form, but only in a way which allows him to acquire object constancy, such as finding a familiar face in a crowd.<sup>17</sup>

#### Two to seven.

From the age of two to the age of seven the child goes through two periods of development. From two to four the child is very egocentric and cannot take the viewpoint of other people.<sup>18</sup> He also can only classify by a single character, for example he can't take into account an object's having both height and width at the same time.<sup>19</sup> He is able to put objects into classes — to classify men and women as people or potatoes and apples as food — but he cannot look at two characteristics or attributes of the same object. He cannot, for example, mentally sort apples into big red apples and small green apples.<sup>20</sup> During this period children learn to match and name colors. They can discriminate and identify color before being able to apply a label. At two years of age more children can match colors (red with red, blue with blue, etc.) than can name them.<sup>21</sup> By the time the children reach the age of four "90% of the children can match colors and about 80% can identify them."<sup>22</sup>

Between the ages of four and seven the child becomes able to see relationships. For example if presented with a group of triangles and squares he can classify them on the basis of triangularity or on the basis of color.<sup>23</sup> This is the beginning of abstraction, as when producing a sum.<sup>24</sup>

About the age of five or six a child learns to identify forms of objects from different points of orientation. For example a diamond-shaped block on its side or a triangle

upside down.<sup>25</sup> At about the age of five the child begins to discriminate forms in three dimensions, telling a ball from a block.<sup>26</sup> At this age the child can also begin to learn the concepts of roundness, squareness, etc.<sup>27</sup> "The more the child continues to respond to an orange, for example, or the more circular of the ovals, the more he grasps the concept of roundness."<sup>28</sup>

During the age of about three to about six there is a change in the child's preference for form and color. "Color becomes preferred about the age of three; color preference then gradually diminishes until age six when form again becomes dominant."<sup>29</sup> It is important to note, however, that children at this level cannot handle color and form simultaneously for the basis of classification of objects.<sup>30</sup> They still are on the level of single abstractions. They could see that bananas are yellow, apples are red, and that both are fruit, but they could not see bananas as long and yellow and apples as red and round.

#### Seven to eleven.

During the period of about seven to eleven the child's reasoning process begins to appear logical.<sup>31</sup> He learns that certain properties of objects remain the same in the face of certain changes. This awareness has been called conservation.<sup>32</sup> For example, if we take two eight inch pies and cut one into six pieces and the other into eight, the child would realize that the quantity of the two pies remains the same, one equal to the other, despite the fact that they are cut into a different number of slices.<sup>33</sup> This is important for the child must be able to see that some items can be in more than one class (red and blue balls can be either in form class or color class) and that some classes can be subordinated to others.<sup>34</sup> If classifying balls according to form, then color is subordinate to form and vice versa.

The nature of the items also influences the way the child categorizes. When animals or other meaningful objects are used, children at the ages of seven, nine, and eleven ignore the structural properties of color, texture, and the material the objects are made from, and classify them according to form.<sup>35</sup> The child during this phase of development is no longer dominated by the environment. He is becoming increasingly objective and able to think in a way which organizes the world around him.<sup>36</sup>

At this stage the child is able to expand earlier ideas of form, for example

expanding the idea of roundness to cylinders and other figures.<sup>37</sup> The child is also able to handle more than one abstraction at a time.<sup>38</sup> He can easily classify objects by color, form, and size simultaneously. Although he can deal simultaneously with several concepts, when dealing with abstractions apart from some form of visual stimulus, he can handle only one variable at a time.<sup>39</sup>

#### Eleven to fifteen.

As the child moves into the period of eleven to fifteen, he moves along the steps to true abstract thinking.<sup>40</sup> He is able to create hypotheses and deduce logical conclusions.<sup>41</sup> This is the age at which the child can plan scientific investigations because he is able to handle more than one variable at a time.<sup>42</sup> He can now handle more than one variable in the process of logical thought, not requiring visual stimulus.

The various stages of intellectual development described have been based on normally developing children of unspecified social or intellectual level. The ages given are approximate and should be viewed only as estimates to give the teacher a base from which to judge the levels of the pupils being taught. Most of these processes show a step-by-step development of the intellect. All readings strongly suggest that a child cannot be taught a concept unless he has attained the level of maturity necessary to understand the concept. For example, you cannot teach a four year old child to conduct a scientific investigation because he has not yet attained the maturation level at which he can handle multiple variables. Therefore, it is very important to know the child's intellectual state in order to plan a workable curriculum. For example, if you wish to teach color, texture, and form, you must understand at what level each combination can be understood. The child of five or six can individually understand form and color, but not texture. The child of eight can understand color and form, the combination of color and form, and the individual concept of texture, but not all three together.

In order to teach aesthetics of plants and gardens, it is necessary for the child to understand the elements of color, texture, and form, and their interrelationships. This involves more than one variable, the forming of hypotheses and the deductions of logical conclusions. Following the guidelines presented above, such a program would necessarily be aimed at the eleven to fifteen age group.



Aesthetics of plants and gardens are then, best taught to children in grades four to six. At this level children:

... are ready to make abstract notions out of concrete information. They are eager to learn some skills, ready to accept information in a more structured situation, and are not yet highly value oriented. This is a rewarding age to teach outdoors because they usually respond with enthusiasm and quickness and enjoy working in group learning situations.<sup>43</sup>

It is equally important to look at the techniques which can be used in teaching and see how they relate to the child's development. One of the oldest and most widely used techniques is the lecture. The instructor, guide, or leader usually imparts facts and information to a group, of varying size, using a script and sometimes using visual aids. Lectures are effective when the main objective is the "imparting of information on broad subjects, easily comprehended."<sup>44</sup> The important point is that "education and imparting information are not synonymous."<sup>45</sup> The goal that should be aimed for is education, "a process of training and developing the knowledge, skill, mind, character, etc."<sup>46</sup> Lecturing is perhaps the least desirable with children. Gager states that "lecturing to large audiences of children usually yields smaller educational returns than anything one can do with them."<sup>47</sup> Because children have a short attention span and lectures require not only attention but the ability to sort out abstractions, this can only be accomplished with children who can handle many variables and deduce logical conclusions.

At any age, however, it is important to keep the child's interest. This can best be done if the child has an active role, with his interests and questions providing direction for the teacher. He should also be constantly encouraged to discover facts for himself. This process of information gathering and problem solving has been called the "Inquiry Method." In this approach the instructor raises questions which, when answered by the students, lead to further investigations of the same topic. This allows the student to solve the problem. It demands a highly trained, sensitive instructor to guide the students to the desired educational goals.

The third technique is the use of example. The instructor either engages in an activity which the students are asked to follow, or gives an oral example on which the children can build. An activity, such as planting a seed, allows the child to deal with a single activity at a time. This works best with children in the seven to eleven age group. When using an oral

example further discussion can be elicited. But this is most effective with children in the eleven to fifteen age group. The instructor might base the example on trees and the discussion could then lead to talk about the function of trees as shade providers, windbreaks or homes for animals.

Any of these techniques can be used in the teaching of aesthetics. The instructor should constantly encourage the students to discover facts for themselves. Interest may be maintained by moving quickly into the various phases of each topic, touching only on the most important points, and allowing the students to build on them. The instructor should remember that many times too much is attempted in too little time with the technique lapsing into a lecture and the learning experience into just an activity. By making sure that the students are ready for the experience, and remembering that it should be skill building, it should involve the senses, it should develop critical thinking skills and be enjoyable, the instructor can make sure

the (class) trip does not turn out to be merely a pleasant or unpleasant outing, but that it shall yield the largest possible educational returns. It is easy for class visits to botanic gardens and museums to degenerate into merely a lark or an hour's freedom from the classroom routine.<sup>48</sup>

The following pages contain ideas for teaching the aesthetics of plants and gardens. While the material presented may seem complex or overwhelming, its use is for the teacher, not the student. The instructor's role is to sort out the pupils' interests, learning levels and attention spans, pair them with the principles to be covered and to utilize the most appropriate teaching techniques available.

The materials and methods presented are merely suggestions for an approach to teaching aesthetics. The instructor is encouraged to explore the methods and materials with which he will be comfortable.

### Concepts

In order to teach the aesthetics of plants and gardens, it is necessary to understand the concepts of diversity, interrelationships, adaptation, and change.

The concept of diversity encompasses the variation among groups of plants, and among individual plants within a group. The individual plants may be cultivars within a species,

for example the variety of flower types present in the many cultivars of the florist's chrysanthemum (Chrysanthemum x morifolium). The groups of plants could be species within a genus. For example the variation among the species within the genus Pinus (Pinus sylvestris, the Scotch Pine; Pinus flexilis, the Limber Pine; Pinus nigra, the Austrian Pine; Pinus mugho, the Mugho Pine; etc.).

By observation the student may be brought to conclude that no two things in nature are alike, they may be similar, but never exact duplicates. Diversity can equally be expressed in individuals that vary in color (Fagus sylvatica, the European Beech versus Fagus sylvatica 'Atropunicea', the purple leaved European Beech), texture (Fagus sylvatica 'Asplenifolia', the fernleaved European Beech), or form (Fagus sylvatica 'Fastigiata', the upright European Beech, or Fagus sylvatica 'Pendula', the weeping European Beech).

The concept of interrelationships describes the similarities of one group or one individual within a group which are more or less distant relatives and how one interacts with the others. This can be seen in the similar effects of color, texture, and form which different plants may bring to the garden. It can be seen as well in the interrelationships of light, shadow and distance on the elements of color, texture, and form. The further you are from color, the less intense it appears.<sup>49</sup> The further from texture, the finer it appears.<sup>50</sup> The further away from a form, the smaller it appears.<sup>51</sup> Light can intensify color, texture, and form, while shadow can cause them to recede.<sup>52</sup>

The concept of adaptation can be used to show how groups and individuals within groups have evolved or developed in response to the environment in which they are found. A good example of this is the knees produced by a Bald Cypress (Taxodium distichum), which are thought to aid the plant in obtaining oxygen for its roots in the swampy, water-logged soil. The change can be in structure, form, or function. Man's role in adaptation is easily seen in the horticultural practices used in controlling form, such as topiary, espalier, clipping, pruning, etc. Man's role in the evolution of plants can be seen in the selection of plants to suit his needs, for example the selection of dwarf forms of shrubs.

Change describes how an individual plant's characteristics may differ with time. As a plant matures, change of color, texture, size, and form usually occurs. This can be seen in

the growth of White Pine (Pinus strobus). As a young plant, it is very dense and very pyramidal. As a mature plant it is flat topped with open whorls of horizontal branches. Both plants and gardens change with time.

In order to better interpret the concepts of diversity, interrelationships, adaptation and change, it is important to understand the aesthetic elements of color, texture, and form.

### Aesthetic Elements

#### Color

The objectives are to show the diversity of color and the effects light and distance have on any color or combination of colors. This may be done both in the classroom and in the garden. The materials used are:

Clear plastic cups

Liquid food coloring and water base tempera paints

Plastic spoons or straws

Light source

Garden plants

Color is one of the forms of radiant energy. The colors are the way our eyes perceive different wavelengths of that radiant energy. This is called light color or reflective color. The color of an object is the result of absorption of certain wavelengths by a pigment, or dye. In the case of a red object, it is not red because it emits red, but because it absorbs all the colors but red. The red wavelength alone is reflected, and seen by the eye.<sup>53</sup>

By having the students combine various colors they can learn the modification of the basic colors or hue. Hue is the name of a color and refers to its position on the color wheel. It includes both pure colors and those in between (e.g., orange of a reddish hue, or red-orange).<sup>54</sup> Using the primary colors of red, blue, and yellow, it is easy to demonstrate the secondary colors of green, orange, and purple, and the hues in between. One should also be aware of the quality called chroma, which denotes the strength, intensity, or purity of a color. The chroma can be changed by the addition of white (value) or gray (shade). The value refers to any gradation of a color with reference to its degree of whiteness. A shade refers to any color with reference to

its degree of darkness. The chroma, therefore, is a unit of measure of change in a hue from neutral gray to the maximum intensity of the hue.<sup>55</sup>

It is important to point out what color can do before beginning.

Color creates space merely by its presence, its intensity, its scale. With a minimum of fuss, it sets a mood, establishes distance, depth. The intrinsic power of color is such that it can suggest almost anything one has in mind, providing one's emotional perception is vivid enough.<sup>56</sup>

The two most important concepts are space and mood.

When talking about color and its influence on space, colors must be divided based on wave length. The short wave colors of violet, blue, and green, are referred to as cool or receding colors. The long wave colors of yellow, orange, and red, are referred to as warm or advancing colors. By taking two objects of the same size, one warm in color, and the other cool in color, and holding them at equal distances, you can see that the warm colored object stands out. It seems to be larger and closer than the object of the same size in a cool color.<sup>57</sup>

Pass plastic cups to all the children, a minimum of three to each, preferably six. Fill each cup two thirds with water, and have each child place drops of liquid food coloring into three of the cups, stirring with the spoons or straws, to form the primary colors. Allow each child to use as little or as much coloring as they desire. Discussion can be held on the chromas that result.

In the remaining cups have the children form the secondary colors of orange, by combining red and yellow (1:3); green by combining blue and yellow (1:1); and purple, by combining red and blue (2:1). Do not give them the proper proportions, but see if the students can figure them out. The results should allow discussion on hues, using properly proportioned secondary colors as standards.

Take a light source, and using two cups which contain water of same color, chroma, and hue, illuminate one. Have a discussion on how the two appear. With the light source, your hand, and pieces of cloth, paper, etc., create shadow and shade effects on the color. Ask for a response by giving such ideas such as: dappled, striated, marbled, chameleon, silhouetted, checkered, mottled.<sup>58</sup> Discuss how or if the shadow changed the appearance of the color.

The second part involves the transferring of the ideas on color to the garden in a comprehensible manner. Try to choose a time when color will be present in the garden. Have the students observe a color from a distance, give their impressions, and then later carefully do the same at close range. Note differences, if any (distance should make the color less vivid, more blue).<sup>59</sup> Then discuss how the colors relate, the dark tones of the tree trunks and limbs (structure), the blue and white of the clouds (airiness), the blue-green of water (instability), and the moods which each color creates.<sup>60</sup> The relation of the classroom exercise to the garden exercise should be based on the pupils' receptiveness and the teacher's interest, knowledge, and preparation. It is important for the teacher to be observant, for example pointing out the lighting on a flower, is it direct, diffuse, frontlight, backlight, etc., and how does it affect the flower's color? Are there subtle gradations of color within a flower? What about the markings of a flower, and their relation to its color? The differences between a flower bud, an open flower and then a wilted flower all on the same plant. The teacher should question if the colors seen are shades or hues. Also, are the red roses really red, or merely reddish hues of purple?

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#### Texture

The objective is to show the student that the term texture is not only used to describe the way things feel (tactile), but also may be used to describe the way they look (visual). The various material needed are:

1. Small sections of three inch diameter branches or logs of smooth barked plants such as young cherry, beech, or carpinus.
2. The same as above only with rough barked plants such as oak, hackberry, or willow.
3. Finished wood

4. Unfinished wood
5. Metal (chrome), glass (mirror)
6. Sandpaper
7. Drawing paper
8. Soft pencils or crayons

Texture is the most difficult of the three elements to teach. Color and form are easier since they are more apparent to the eye and learned at an earlier age.<sup>61</sup> The teacher must be observant. Even though textures are subtle, they are without limit in a garden. In order to understand textures visually it is best to begin with tactile textures. Tactile textures refer to the contours or profiles on the surface of an object. Webster defines texture as "the arrangement of the particles or constituent parts of any material."<sup>62</sup> For tactile texture you are dealing with the particles or a very fine conformation of the surface. With visual texture you are dealing with the apparent constituent parts of the whole.

Take each of the various materials, such as sandpaper, various textiles, chrome or metal, wood, pieces of logs, glass, etc., and place each into a bag, or a box with an opening cut in the side. Have each student place their hand in each box or bag and feel each of the materials. Have them describe the texture using a single word such as: fibrous, hairy, wooly, silky, wiry, smooth, jagged, thorny, pitted, velvety, spongy, padded.<sup>63</sup> The instructor should open the discussion with such questions as: How does the surface feel to the touch? How would it look if magnified? What is its profile?<sup>64</sup>

After completing the tactile exercise remove each object from its bag or box and discuss it visually, how it looks in comparison to how it felt. Open discussion and again ask for one word descriptions such as: granular, stippled, fine, coarse, spotted, toothed, scraped, smooth, corrugated, pitted, inlaid, stained, shiny.<sup>65</sup> This could also be made into a game where the children guess which object created which tactile sensation.

To make a transition from the classroom objects to the garden use photographs or materials such as bricks, gravel, leaves, etc. Ask the students to give one word descriptions on how the objects appear. Then relate this to how they feel. They should see a relation between the tactile and the visual textures. Then make use of photographs to illustrate some of the

visual textures to be seen in the garden. A good example of the types of illustrations to use is on pages 72-73 of the book Landscape Gardening by James Underwood Crockett.

After this introduction it is time to visit the garden. The child should realize what creates the plant's tactile textures, and what influences the plant's visual textures. The important elements are the foliage, its size, the way it is attached and how it hangs; the spacing or grouping of twigs, branches and leaves; bark characters, etc.<sup>66</sup> The larger leaves and those set far apart will appear as coarser textures than those which are small, have deeply cut edges, or are closely set together.<sup>67</sup> The color, and shape of the leaves, especially leaves with contrasting undersides or those which move, either because of long petioles, or because they are long and narrow, can change texture.<sup>68</sup> If possible compare the textures of two treatments of the same plant (e.g., Yew) where one is clipped or sheared and the other is allowed to grow naturally. See if the pupils note any difference in texture. (Most plants when clipped or sheared will appear to be heavier and coarser.) To convey bark textures have the pupils do rubbings using paper and soft pencils or crayons.

Light and shadow must also be considered since shadows can affect texture as well as form.<sup>70</sup> The density and coarseness can be affected by shadow. Coarse textured plants often appear closer, while fine textured plants appear further away.<sup>71</sup> The plants with a looser habit of growth will often cast shadows among their own foliage making them appear lighter and softer, thus finer in texture than if shadows were not present. (This only appears with age and maturity.)<sup>72</sup> This change can affect the apparent distance. The clipping or shearing destroys shadows because the foliage lies in one plane.<sup>73</sup> Texture is a concept which is difficult to understand, but if the teacher is perceptive and observant, the basic ideas can be transmitted to the students. It is important to gauge the student's level to avoid confusion and loss of interest.

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## Form

The objective is to show that form is the shape traced by the eye. This shape, and its size, defines a space. The materials needed are:

1. Drawing tablets
2. Charcoal pencils or similar soft pencils
3. Various leaves
4. Blocks of wood in various shapes, square, pyramidal, etc.
5. Apple, pear, or orange
6. Seashells

Form is easier to perceive than visual texture, yet still requires close observation to note the silhouette that a shape makes, its varying contours, how it faces, its angles.<sup>74</sup> The form of plants is based on their natural habit of growth.<sup>75</sup> This can be altered by clipping, shearing, pruning or training. The natural shape is also subject to change.

Each student should have a drawing tablet and a soft pencil. Three or four different shaped objects should be placed in front of the student in a well illuminated, slightly elevated position. If enough similar objects are available it is best to allow one per student or pair of students.<sup>76</sup> Allowing each of the students to use only ten lines, of any size or shape, ask them to draw the forms of the objects. After the exercise is completed, have a discussion on the various forms, asking for one word examples: round, globular, pyramidal, amorphic, free-form, symmetrical, elliptical, angled, squat, contorted, distorted, blurred, scalloped.<sup>77</sup> Following the discussion of the overall form, discuss the feeling that each form gives. Is it strong, weak, soft, harsh, projecting.<sup>78</sup> Then discuss what features make it that way: the presence of strong horizontal lines which create a feeling of breadth;<sup>79</sup> the softness of curving, weeping lines;<sup>80</sup> or symmetrical lines.

After this discussion it is time for the pupils to take their drawing tablets and pencils and move into the garden. Verbal descriptions of plant forms cannot convey their visual characteristics.<sup>81</sup> The terms oval, elliptic, broad-headed, vase-shaped, etc. are meaningless unless understood.<sup>82</sup> Observation helps to clarify these terms.

Choosing several varying plants such as Littleleaf Linden (Tilia cordata), European Beech (Fagus sylvatica), and its weeping or cut leaf forms, Weeping Birch (Betula verrucosa), Amur Cork Tree (Phellodendron amurense), Arborvitae (Thuja occidentalis), Ginkgo (Ginkgo biloba), Pin Oak (Quercus palustris), Mugho Pine (Pinus mugho), Douglas-fir (Pseudotsuga menziesii), have the students sketch the forms, paying attention to the branching habit. Have each student use only ten or fewer lines per plant. The same could be done with clumps of annuals or perennials, paying attention to the overall form of the clump, not individual stems.

Following this exercise, again discuss the shape or form of each plant, asking for one word descriptions. For example: upright, conical, ovate, egg-shaped, round, pyramidal, flat-topped, vase-shaped.<sup>83</sup> It is also important to point out the difference in form between juvenile and mature plants. A good example is the difference between young and old White Pines (Pinus strobus). The change from symmetrical to asymmetrical should be easily observed.

The student should be able to see the effect strong lines have on form. Dogwoods (Cornus florida, Cornus kousa), Pin Oak (Quercus palustris), Hawthorns (Crataegus spp.), and some viburnums (Viburnum plicatum var. tomentosum 'Mariesii') develop strong horizontal lines. These lines carry the eye along making the form appear wider than it really is.<sup>84</sup>

Vertical lines carry the eye upward as in Arborvitae (Thuja occidentalis), Lombardy Poplar (Populus nigra 'Italica'), and the many fastigate, upright, and columnar forms of common plants, making the shape appear taller than it actually is.<sup>85</sup>

Weeping, drooping or pendulous plants give graceful lines creating shapes that contrast with those which are more upright.<sup>86</sup> Some examples are: Weeping Cherry (Prunus subhirtella var. pendula), Weeping Willow (Salix alba var. trista), Weeping Beech (Fagus sylvatica var. pendula) and Forsythia suspensa.

Rounded or globular forms tend to appear more massive.<sup>87</sup> Examples are Boxwood (Buxus sempervirens), Yew (Taxus spp.), Norway Maple (Acer platanoides), and a variety of oaks.

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In conclusion, it is hoped that by giving children exposure to the aesthetics of plants and gardens, we can help achieve a population which is more observant and therefore more sensitive to the things around them. This can only be done if, as Howard Gardner stated, we begin by "teaching children values and taste."<sup>88</sup>

Although learning in the words of Vincent Rogers, is "as natural as breathing to most students,"<sup>89</sup> unless the teacher has, as C. W. Furlong stated, "a love for all things beautiful,"<sup>90</sup> neither the teacher nor the pupil will realize that the complexities being studied are not beauty. The plants and gardens are not beautiful. Beauty is in the study, the acquiring of perception, the self satisfaction: the creating process. As Jacob Bronowski states,

It is not the thing done or made which is beautiful, but the doing. If we appreciate the thing it is because we relive the heady freedom of making it. Beauty is the byproduct of interest and pleasure in the choice of action.<sup>91</sup>

## FOOTNOTES CHAPTER II

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