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ROCHESTER INSTITUTE OF TECHNOLOGY

A thesis submitted to the Faculty of
The College of Fine and Applied Arts
for the Degree of
Master of Fine Arts in Computer Graphics Design

"Elementary Art Education Curriculum:
The incorporation of the computers in the art room"

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"Whether we communicate through drawing, whether we catch fleeting images in spontaneous sketches, whether we are fully aware of what we are aiming at and the effect we will achieve, or whether we draw out of the pure instinct of play to relax the hand and eye, the basic problem is always a creative one: all content (perception, feeling, memory, imagination, and invention) must be expressed with the graphic means that suit it. A picture must rely for its effect more on this process of expression than on anything else. This is where knowledge, ability and experience in drawing are revealed and this is what we are concerned with."

Gottfried Tritten
Teaching Color and Form
page 27.

INTRODUCTION

The incorporation of Computer Graphics into the art education curriculum, provides an additional teaching tool along with traditional means; such as drawing, painting, sculpture, clay, printing and pre-printed imagery. Art education is the development to enrich individualism and the cultivation of uniqueness.

Computers offer unlimited opportunities to enrich, extend, and effectively manage instruction and design. The computer field is an additional medium to be explored. The art curriculum must be developed around the potential or limitations of the students and the tools available. From the tools of software and hardware, a final choice can be made based upon the demands, needs and objectives of the users.

PHILOSOPHIES AND THEORIES

Learning takes place with experience, imaginative thinking, concept formation, pleasure in the activity and creative action. For children, their sense of achievement may be important, but what the child learns from doing is more important than the end product. Each child must develop and learn at their own pace, and their sense of self will become apparent. Development of the child's sense of self enables them to become more visually aware of their environment and the relationships between people and objects.

Art education planners have to know and understand what children need for useful, happy and healthy living. To accomplish a successful curriculum, certain questions have to be answered:

- What educational purposes should the school seek to attain?
- What educational experiences can be provided that are likely to attain these purposes?
- How can these educational experiences be effectively organized?
- How can we determine whether these purposes are being attained?

There are no simple answers to these questions, because they vary from age levels. You must have the concept of your goals. These become objectives for materials selected, content outline, testing, and examination of prepared goals.

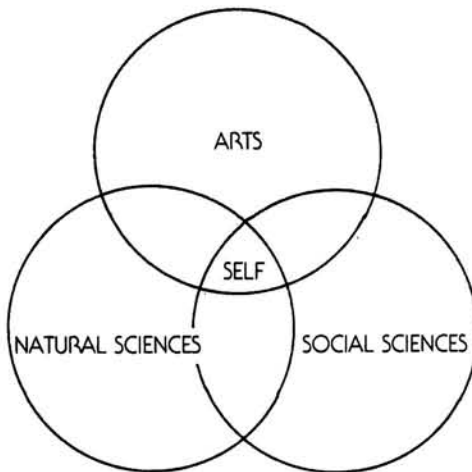
Art emphasizes and increases the interrelationship between of thinking and feeling.

ART = PLEASURE/FUN + INVENTION/ KNOWLEDGE

Art is the opportunity to apply reason to impulses; to use the imagination and draw from experiences. It is only by expressing what is within the child, that can keep alive the creativity that is in every person. Conformity comes from children copying other things and this should be stifled. The graphic statement a child draws, is the freshness and directness of the child's creativity and imagination, rather than a representation of an object.

Children's drawings have many characteristics. They range for each age level. One characteristic is a symbolic scheme for representing the figure, using the child's own representations, with any change that signifies increased awareness and learning. A second is the "Base line" concept. Everything has its place in a child's mind, to establish relationships. A third characteristic is the concept of the "Fold-Over Pictures". A child will draw what they see as true but will not be in true perspective or visual realism. A few other characteristics are: X-ray pictures, what is inside a form; Series-time pictures, story telling; Multi-viewpoint pictures, all sides drawn; and the knowledge of three dimensional space. Standards of realism can be seen in children's drawing as approaching adult level at the age of nine. In school, value comes from group activity. This activity may gain confidence and courage to do more in a group than by himself.

A child is made up of three worlds:

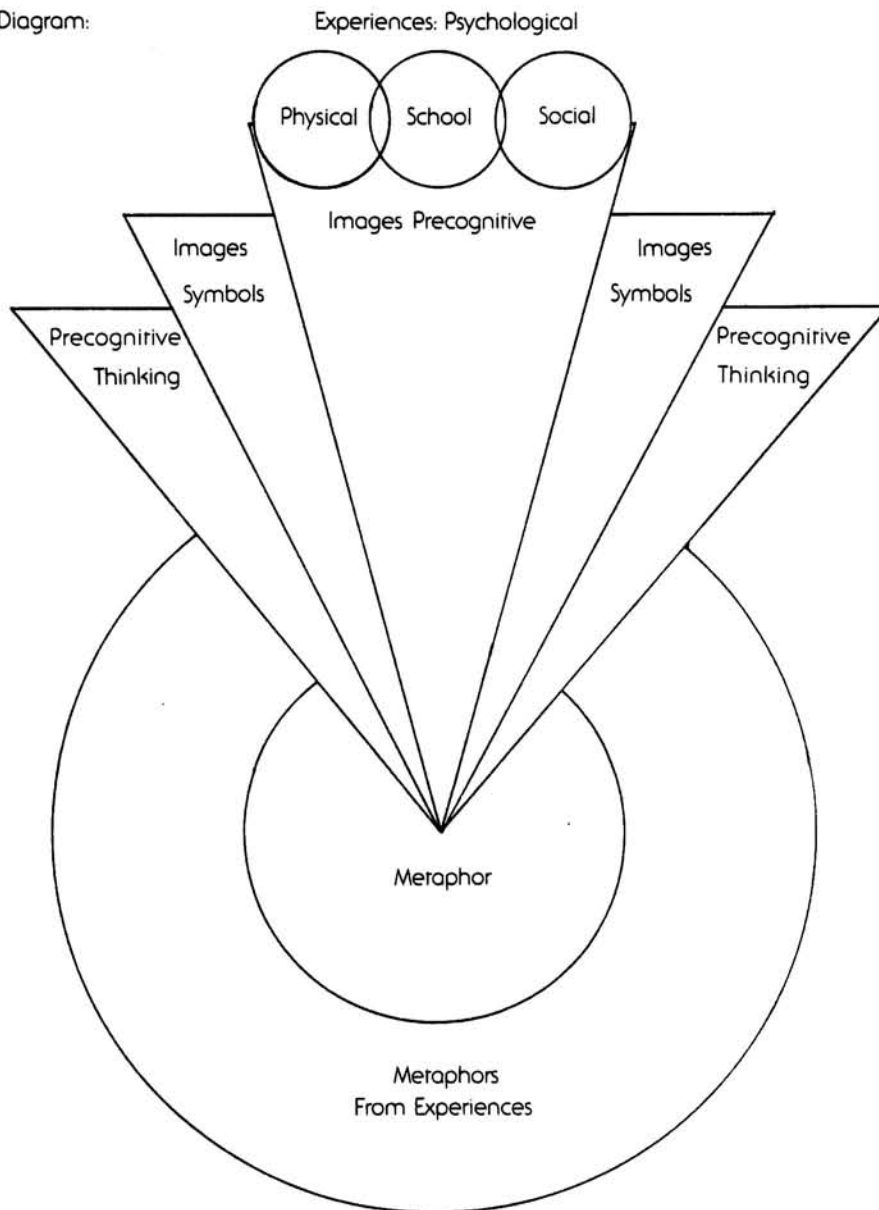


PLAY = EXCITEMENT & EXPLORATION &
EXPERIENCES

PLAY = IMAGINATION + KNOWLEDGE

These worlds plus the concept of "play" make the child's goals more accessible. "Process": art is the spirit that can invigorate the whole of the process of learning, of flux, growth and change." (1) Productive thinking is the process of integrating thinking with the act of producing forms that are expressive of processes and purpose of art activity. A child's self experiences and processes of learning are in relationships as symbols are to metaphors; therefore, as precognitive thinking is to productive thinking. The goals of education are to produce a real condition, as a sign of the quality of process; "signs of existence of education". Productive thinking equals a child's growth, and a child's play is his productive thinking. "Once the metaphor has been formed, process of evaluation leads to increasingly richer understandings that provide for the enrichment of experience and the development of more sophisticated precognitive, productive, and forming processes." (2)

(3) Diagram:



(1) Process of Art Education on the Elementary School:

George Conrad: Prentice-Hall, Inc.: page ix.

(2) Ibid.: page 57.

(3) Ibid.: page 58.

EQUIPMENT TO BE USED

Currently the computer systems that are available at the Elementary school level are the Micro-computers. Among the brands on the market are the Apple and Apple II series, Macintosh, IBM PC, and most recently the Amiga. The system available most readily at the present time, is the Apple IIe series. This is the system used in all software and testing, for this report. Some peripheral equipment used are: koala pad, light pen, monitors, printer, disc drives, and keyboards.

At this point in a child's education (about fourth grade), they should have been exposed to the use of computers. The computer, today, is being introduced as early as kindergarten; in some cases earlier in the home. Therefore, if a child has not had the experience of using and working on the computer, at this time the lesson on the computer use should be taught.

SCHOOL LEVEL

The major problem in curriculum planning is the development of a means for providing experiences that will make possible an increasingly useful participation in the processes of art activity. The planning of means for transferring the valuable learning techniques are provided by art to other areas of the school program in which they can be used. Art education requires a curricular organization based upon thinking and learning techniques that are useful for all phases of living.

Cultural characteristics influence children's art just as it has the Masters. Children choose their subject matter from their environment. An example would be that girls choose feminine subjects (dolls, play house, etc.) and respectively, boys choose masculine subjects (war, sports, etc.).

The level of concern of this thesis is the Elementary age levels. At this point of the thesis, for research and testing purposes, the grades 4 through 6 were observed and reviewed. At the age level of nine through twelve, the children are very receptive to the learning and the knowledge of the adult world.

AREAS TO BE COVERED

Visual language is your own experiments, research, and discovery. "While learning to solve visual problems in the language of a computer is an important part of computer graphics, an equally important task is developing the ability to design aesthetically pleasing graphics if the two, the latter is the more difficult."(4)

In planning a curriculum, there is a need to realize basic principles of visual composition, setting reasonable time limits and planning for technical preparations that are needed. The first step in the curriculum is the education on the computer. The lesson on complete computer usage; keyboard, storage (disc use), programs, etc., must be covered completely.

Before using the computers in lesson plans, an organized planning of designs and activities must take place. All lessons lie on creating good designs to fit traditional methods and the computer screen. It is a good idea to take advantage of all features of the art world; showing examples of work produced on the computer and examples of various other techniques.

At the beginning of each assignment, there should be a preparing of colored pictures as a foundation to the lesson lecture. The best results come from detailed preparation, or looking at other works, from the Masters to examples from other classes of the same level. Also discussion of work in progress should be implemented continuously in terms of computer activity, capabilities and how they respond to limitations and what they would do if another chance could be taken.

There are three kinds of movement in an education process: that which a person is involved, that in which is observed, and that which is represented in art forms. Examples of these three elements are: swinging on a swing, watching someone swinging on a swing, and producing a picture or sculpture, etc., of someone swinging on a swing.

Each project is to be thoroughly designed. The first step is to acquire all of the necessary materials. The second step is in preparation. This may involve thumbnails, pre-drawings of textures, patterns, forms, etc., and may be carried out with cutpaper, stamps, color wheels, etc. The third step is the procedure, the creation of art work, whether it be computer imagery or painting or any other art form. The fourth step is the evaluation, talking about the work, the good and bad and concluding with the process to enhance a form. The last steps have to do with further researching; finding similar objects, other animals, people and in the area of art appreciation, studying artists using similar techniques or the opposite types of fields.

Each lesson plan shown here is to be completed over four sessions, each session being forty-five minutes long. Carrying each plan over a period of time enables the children to expand their ideas on a specific topic, and to explore various methods of producing their artwork. An example of this program of execution would be to use charcoal one session, lino-cuts on the second, computers on the third and watercolor on the fourth.

VISUAL EDUCATION (THROUGH THE AGES):(5)



The list of topic areas are: line, shape, form, texture, color, movement, pattern, perspective and the use of the computer.

(4) School Arts: November 1983: Page 21.

(5) Pickering, John M.: Visual Education in the Primary School: Page Intro.

LINE

Every line has width, length, movement, expression and direction. Lines are a basic element and tool. "A 'Line' is a point that moves leaving a trail behind it." (6)

Lines suggest volume, forms in nature, man-made objects. Drawing can be taken from plants or seeds, side by side to build up design and overlapping lines create form. Large drawings can be grouped together to create series of situations, and three dimensional surface qualities.

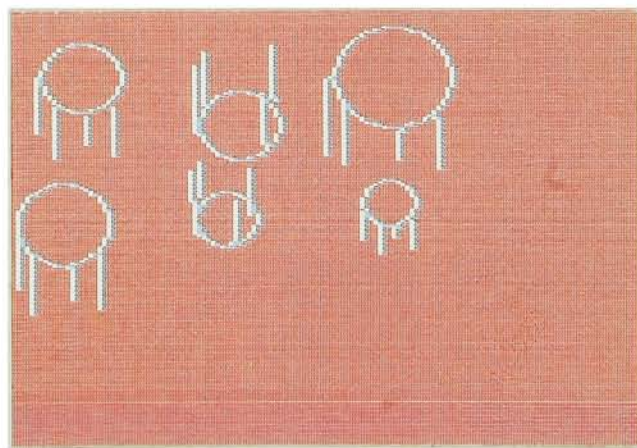
How many lines can be created; Are they different or the same; How many lines in an image or how many different kinds of images can be created with line? There are as many different types of line as there are personalities. For this lesson the idea of line is introduced but can be executed in thousands of ways. Among the many ideas for projects, the teacher can choose which he/she would like to expand upon within the four sessions: gesture drawing, graphic rendering, sketching, shading with line, outline, "Pollock" painting, pattern, textures, spirals, circles, angles, horizontal/vertical/diagonal lines, all combinations to create "faceted" objects. All projects that can be created by traditional means, can also be created on the computer.

SOFTWARE SUGGESTION FOR USE:

Delta Draw: linear drawing

Pen Painter: portraits, calligraphy

EXAMPLES OF "LINE" IMAGERY:



SHAPE

Shape can be defined as a two-dimensional or three-dimensional area. One use of any line is to define an outline of an object. With every shape created, there are two shapes present; the shape within the line and the shape of the area around it. "How many shapes are there?" "Can you create ____ shapes with only ____ shapes?" (Two questions to be asked when creating shapes).

Shapes can occur haphazardly or chaotically, lacking in design or they can be very carefully arranged and orderly. They may be made to move forward and back using scale, color, or tone. There are families of shapes, ones that are similar in form, color or pattern or ones that are harmonized with one another. There are also shapes that make up a picture plan, in a figurative or pattern-making quality or ones that are part of a collection of objects and information.

Children about the age of nine become more shape oriented. They see things from their own world and use them to create their artwork. They may use their initials or the shapes seen when looking through a tree.

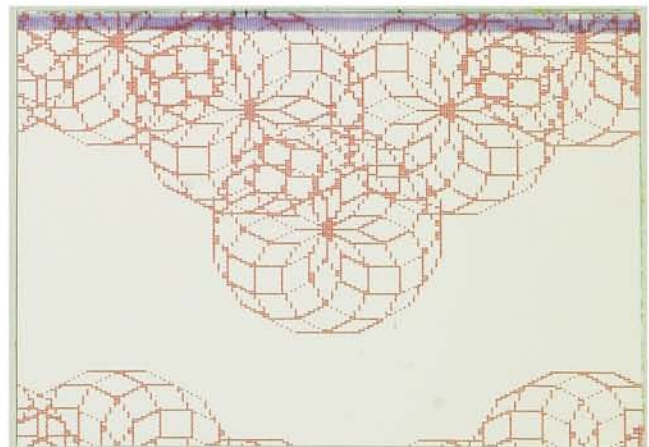
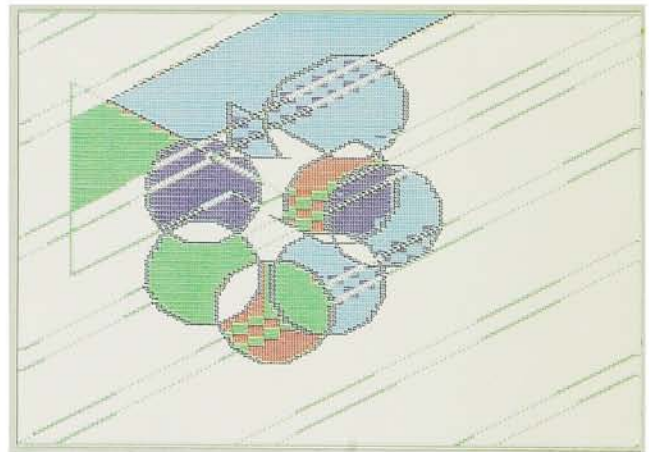
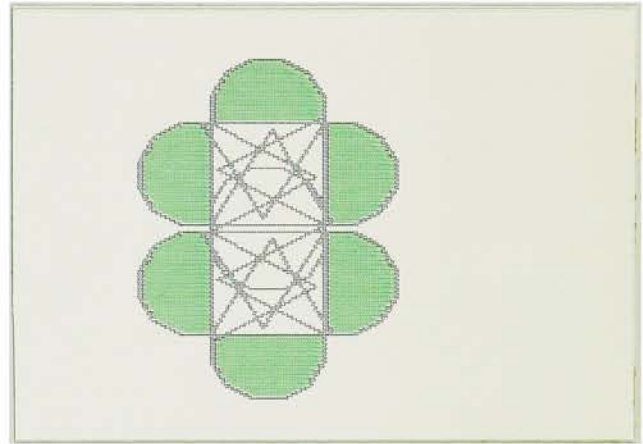
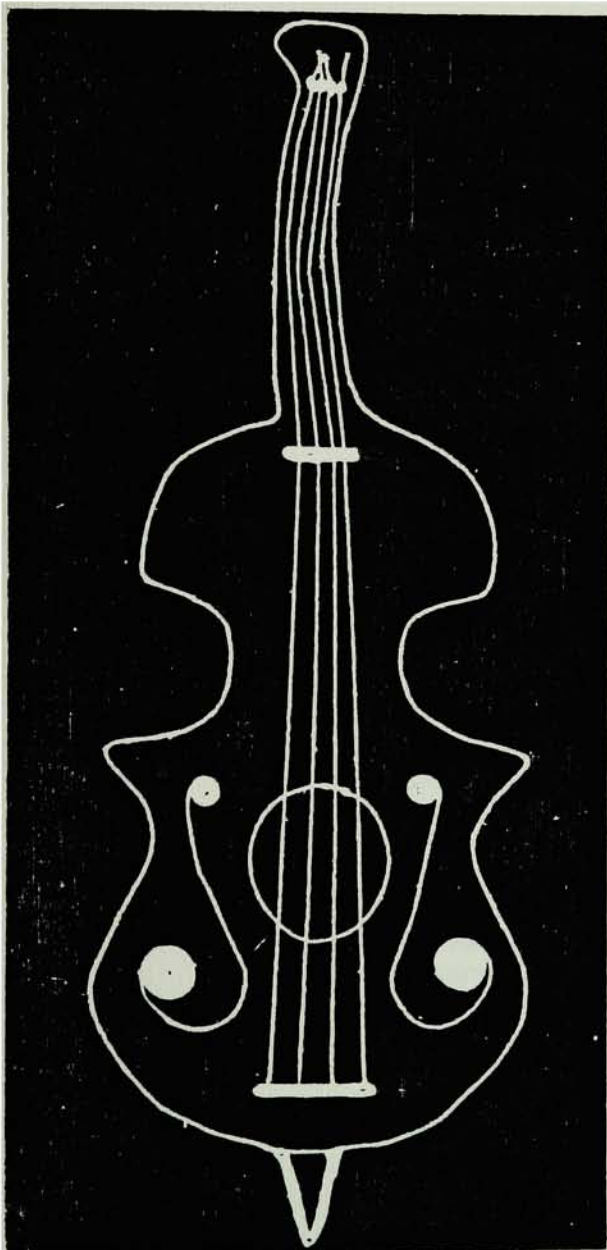
The projects to be used for this lesson may revolve around the child's environment: his room, the school room, or his play area. The shapes may also be found within his own possessions: toys, musical instruments, or books. Examples of ideas for lessons would be: "found objects" drawing, geometric shape drawing, abstract shapes, shapes from negative areas, portraits, still life drawing, drawing with graph paper (using squares like pixels of the screen).

SOFTWARE SUGGESTION FOR USE:

Delta Draw: linear shape drawing

Dazzle Draw: more complex imagery

EXAMPLES OF "SHAPE" IMAGERY:



FORM

Children by the age of nine to thirteen, show a concern for three-dimensional aspects of their environment. Forms with light and shade begin to become evident in their work. The three-dimensional shapes now have apparent height, width, and depth or thickness. Discussed with form, tone also becomes very important in the art work. The child begins to understand an object and its situation in space by observing the gradation in the tone as an object turns away from the light source; the suggestion of form.

When creating forms we must keep in mind the light source. To draw forms, there can be the use of wire or lines drawn, like a wire box, or using line to define tonal areas on a form. The "direction of light" is the tone falling on the object. Tonal illustrations can be created using black and white on a surface. The spatial relations on the two-dimensional surface will be affected by tones. Some colors will appear to be closer to the eye than another, and placing colors that are far apart from each other on the scale and the form, come closer together.

To create exercises or lessons for form, there can be many aspects or fundamentals used. Tonal projects can be completed by: creating scales going from pure white to a pure hue for each color in a given number of steps, going from pure hue to pure black, or creating concentric squares for each hue from black to the hue to white. Examples of exercises on form could be: ready-made objects (cartons, roller rolls, etc.), buildings under construc-

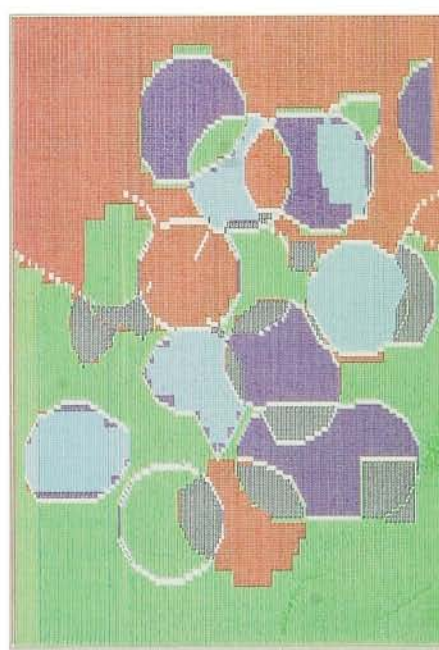
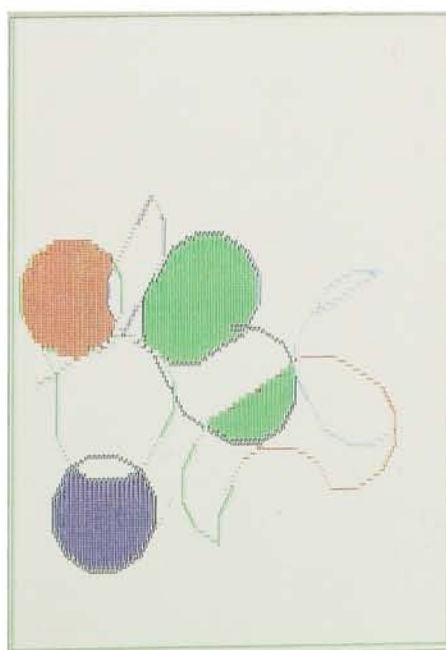
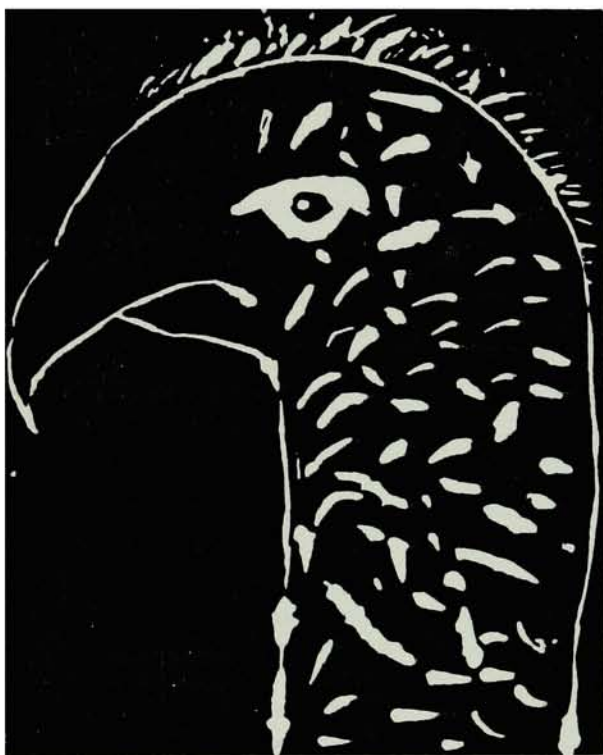
tion, spools of thread, parts of egg cartons. Any other found object will be a form, or using own forms created from paper or cardboard or clay or any carvable substance. To create objects on the computer, three-dimensional objects can be drawn or architectural views or "wire frame" (line) forms of a figure, animal or another object.

SOFTWARE SUGGESTION FOR USE:

Dazzle Draw

Complete Graphics Systems

EXAMPLES OF "FORM" IMAGERY:



TEXTURE

Texture is the "touch" confirmation of what we think we see. When creating artwork, the idea of texture of the object, and how much it should influence the object comes into play. Should the tactile sense of the object become involved in the visual textural quality?

The discussion of textures include the natural objects: stones, vegetables, bark, fish, rice, feathers, etc., and the man-made objects: bricks, basketry, netting, plastics, cardboard, printing, carving, fabrics, etc.

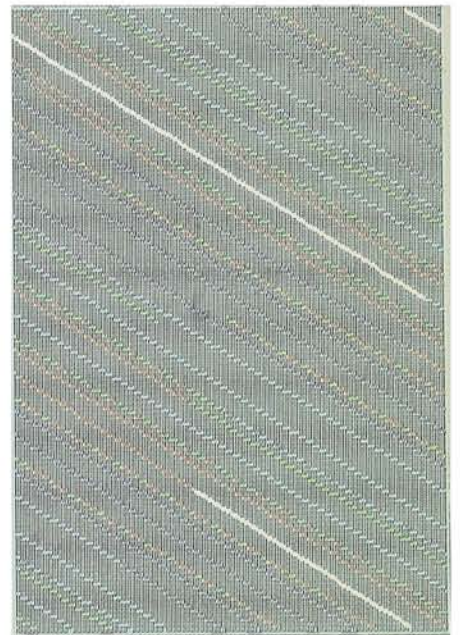
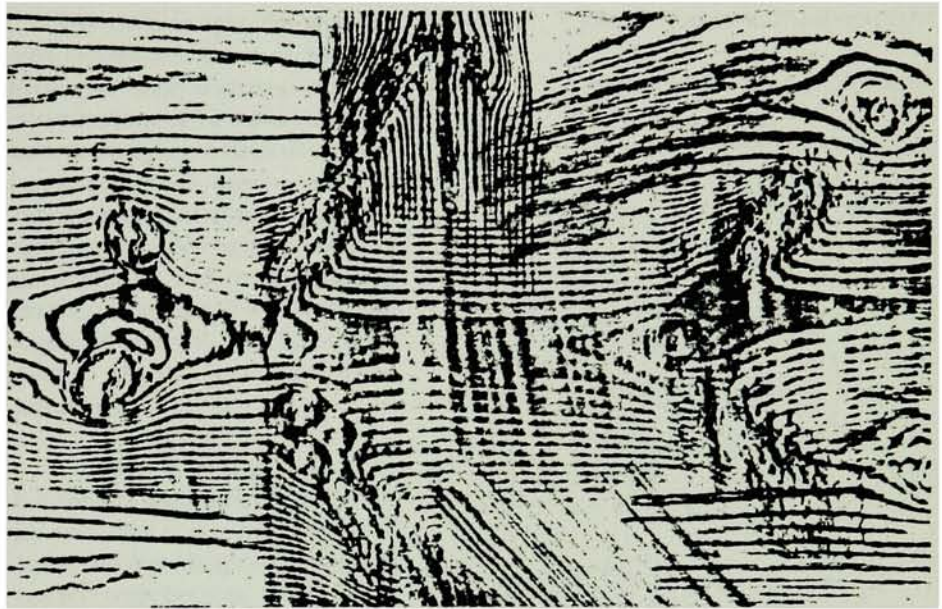
There are many ways of teaching the aspects of texture. Among them are: resist techniques, re-creating textures, manipulating textures, combining textures, and manipulating objects to draw textures. Examples of a lesson could be: finding or collecting materials and sorting them by textures, woolly, soft, rough, hard smooth, etc., or to create collages out of textures.

SOFTWARE SUGGESTION FOR USE:

Pen Painter

Koala Painter (Micro-Illustrator)

EXAMPLES OF "TEXTURE" IMAGERY:



COLOR

The world of light, the world of color, has led us on a path of discovery, experimentation and calculation of our knowledge of the world around us. Color is the different stores of information tapped in our memory, new and lasting associations of our worlds. Contact is made, a chain reaction begins of active thought and our feelings and actions are aroused. This is where dialogue of color begins. Color is individual and has to be experienced subjectively.

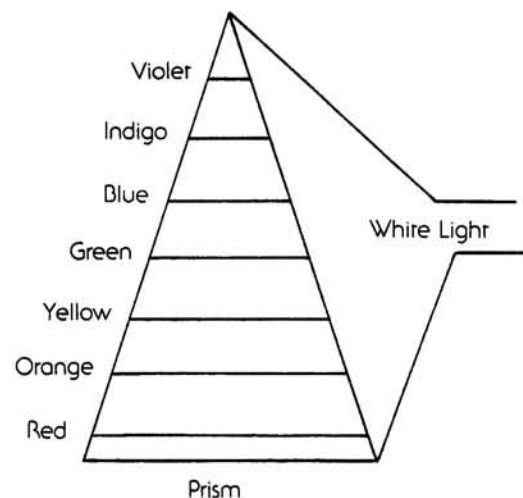
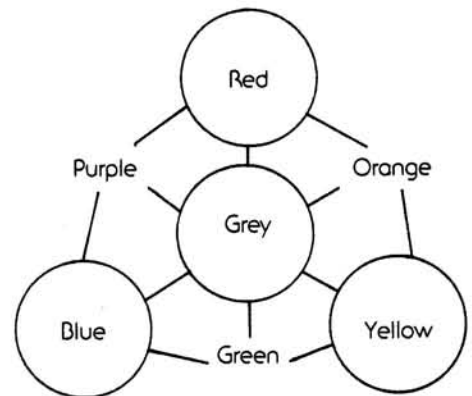
Everyone is involved with color, but need to know little about it to enjoy and use it in our everyday experiences. We are influenced in what we buy and enjoy because of color. "Color is often the reason for a personal choice of objects, for books taken from shelves to read, and materials chosen from a waste-box for collage work." (7)

Color is important at any age. The brighter the color, the more appealing it is to a child. About the age of nine, the child has the ability to mix, control and modify a color. The experience and practice increases his skill in painting, color awareness and differences in his environment. Color "play" can be a learning experience with found objects, textures and patterns. Children grasp the concepts of color when it comes from their own experiences.

Colors are produced two ways: when colored lights are mixed and when colored pigments are mixed. Color is also dependent on light and can be a way of seeing with practice and experimentation. Important characteristics of color are:

1. Intensity (brightness/nearness to purity)
2. Temperature (feelings of association)
3. Tone (reflective light-lightness/darkness)

The basic charts on mixed color are:



Primary colors are: Red
Yellow
Blue

Secondary colors are: Orange
Green
Purple

Tertiary colors are: Yellow-orange
Orange-red
Red-violet
Violet-blue
Blue-green

Green-yellow

Neutral colors are: Black

White

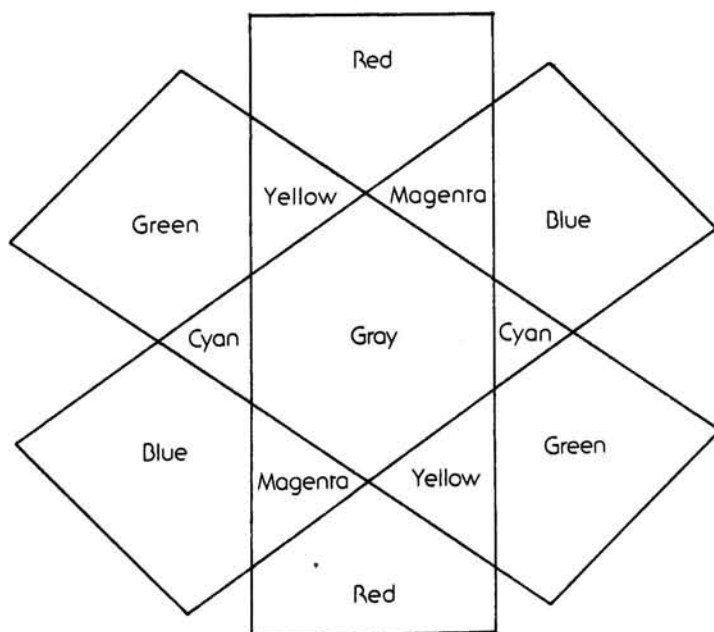
Gray

HUE = that property of color we see;
such as the redness of a color.

SATURATION = amount of hue;
pure to gray.

LUMINOSITY = amount of light;
black to hue to white.

The basic "light" color chart is:

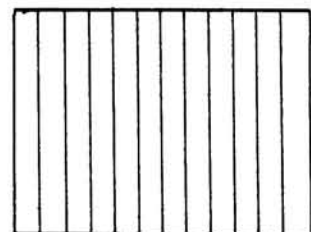


Primary colors are: Red
Green
Blue

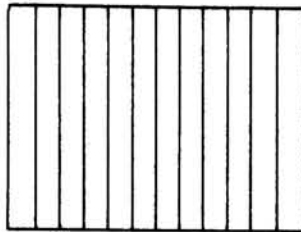
Color is a personal matter. Practice in color leads to increased color sensitivity, depth of knowledge and confidence in its use. Discussions are useful if children are encouraged to seek answers by their own questioning of experience in their own environment. Characteristics of color theories involve great depth of discussion. For this purpose these are the topics only: intensity, hue, value, vibration, edge hardness, quadrant progression, color distortion, temperature, transparency, field progression, geometric progression, density, positive/negative effects, weight, recession/advancement in space, proportion; hue spacing, value spacing.

There are endless experiments to reach about color. Color limitation can be useful towards sense and awareness. A few experiments that may be executed:

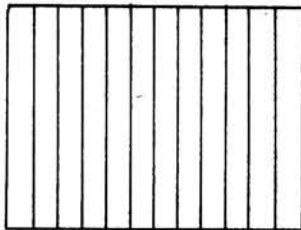
1. use a grid or through picture making to see tonal ranges (monochromatic system).



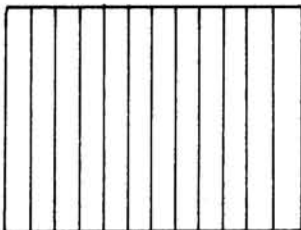
white through
red to black



red through
black to green



yellow through
orange to red



purple through
blue to green

2. in a section about tone:

-use color modeling as an illusion of form

(shape roundness of an apple or a box)

-use one hue: vary pigment with varying amounts

of water (no black or white)

3. sense of form can be suggested using different

hues (has great emotional power)

4. color mixing for transparency effects

5. color harmonies: mixing palette

(example project: paint two blobs of contrasting

color and try to paint a background to neutralize

their contrast)

6. distance/color density:

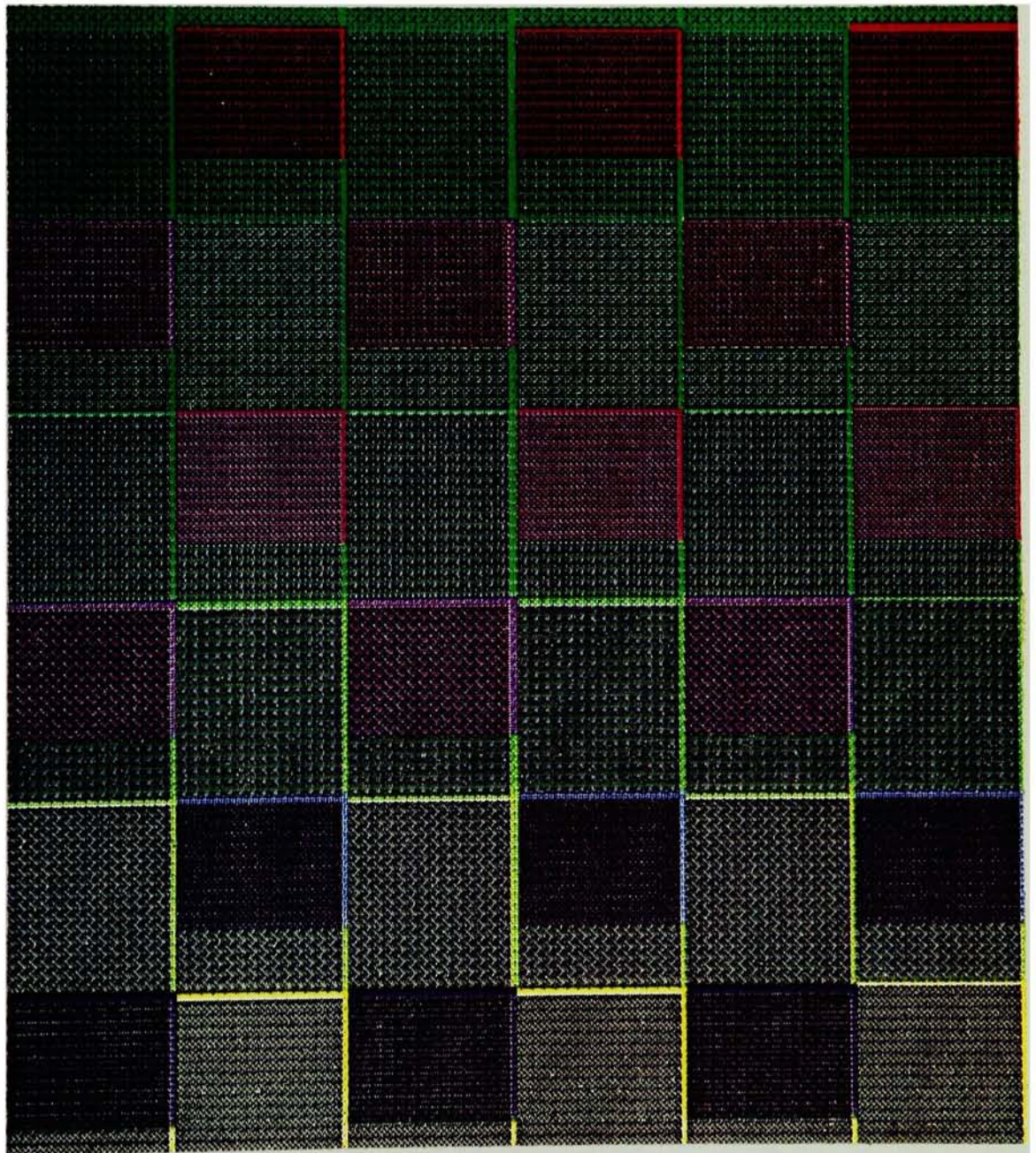
-areas of bright, intense color with areas of middle

(gray) or a little darker

SOFTWARE SUGGESTION FOR USE:

Complete Graphic Systems

EXAMPLES OF "COLOR" IMAGERY:

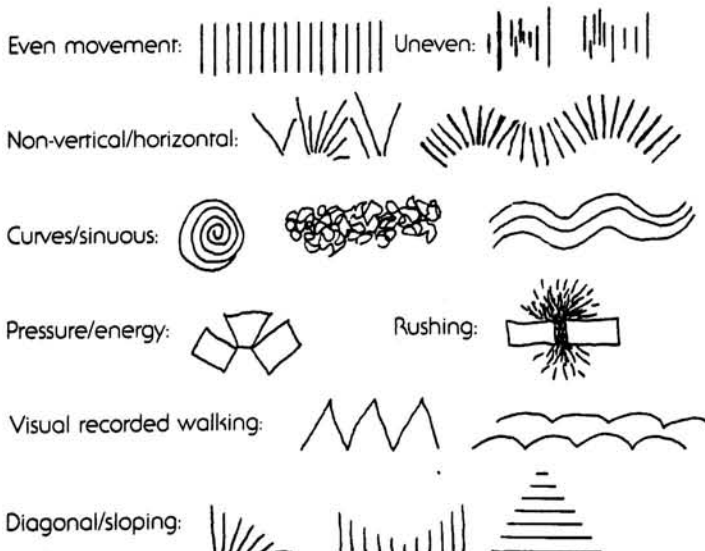


MOVEMENT

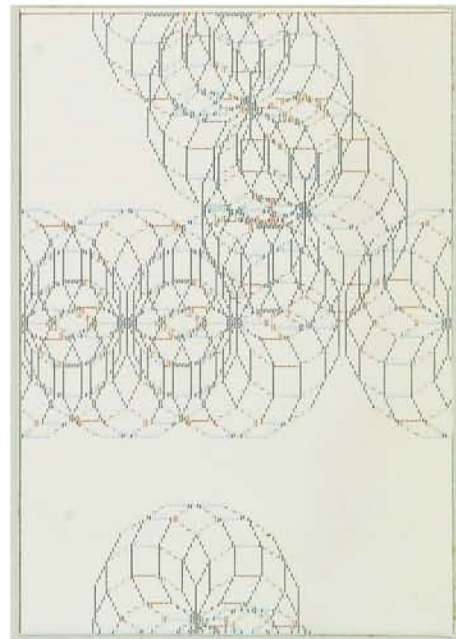
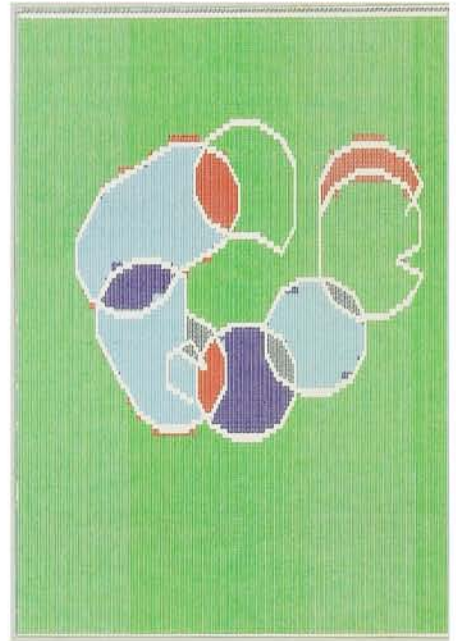
Movement equals time. Movement and growth are closely related. There can not be growth without movement. It is the tension, excitement, place, speed and action.

The study of movement in our environment is the studying, photographing, listening to the people and objects around us; the traffic, repetition of lines and shapes, routes taken by children, sound-natural phenomena, bear and rhythmic patterns, lines that have suggested forces (fire, wind, moving trees and grass, tornados, whirlpools). Apparent movement is the motion made in creative work, two and three dimensional. Actual movement is the motion of a child running or walking. Action movement is the study of object movement.

Movement in art work is the recording of visual movements in our environment. Some examples of linear movement could be:



EXAMPLES OF "MOVEMENT" IMAGERY:



PATTERN

Pattern is repetition, whether it be regular or irregular. Examples of patterns or repeating patterns can be found everywhere in our environment: the supermarket, shelves of tins, bottles, etc.; fish shops, boxes of fish; crated milk bottles; boxes of fruit or vegetables; lumber yards; places with crowded spectators; man-made objects in the environment, bicycles in a rack, pipes, fabrics, street benches; the list goes on forever.

For a child, projects can be designed around any of these ideas, topics or specific areas. They can make lists either drawn or written. Examples of some projects could be: re-creating an existing pattern in a new media, creating one object then repeating it, creating a woven pattern, calligraphy, textured patterns, drop patterns, one object with patterns inside or that create the object.

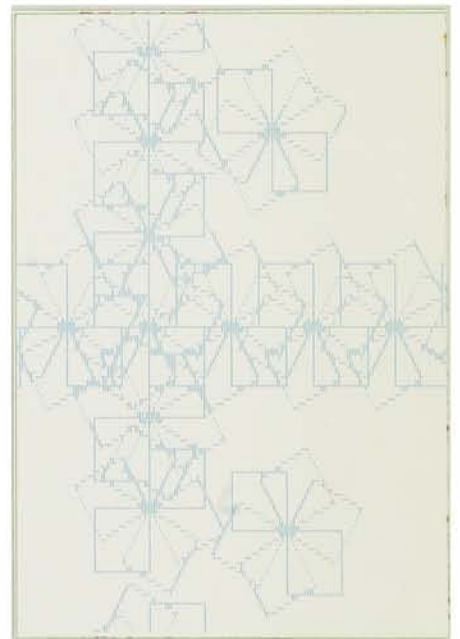
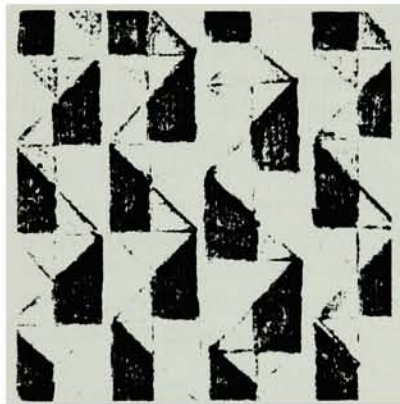
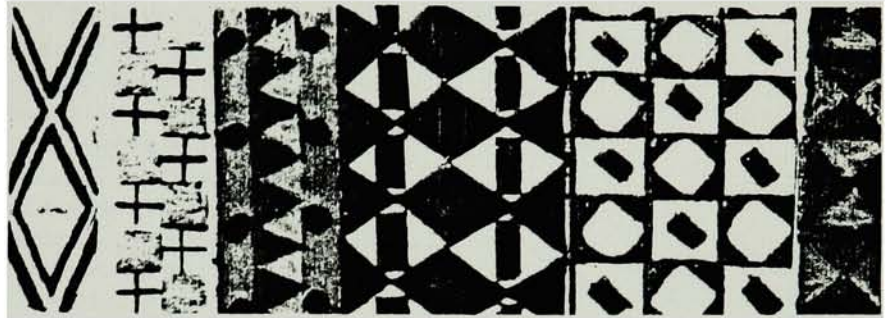
SOFTWARE SUGGESTION FOR USE:

Pen Painter

Koala Painter (Micro-Illustrator)

Some examples that may be used in almost any of these sections are those of Ornamental design: wood, flowers, butterflies, factories, cathedrals, animals, color qualities, fairytales, color in itself, dreams, peacocks, portraits, lions and tigers, owls, positive/negative motifs, bible stories, tournaments, technical/spatial representations, decorations, birds, basic color theories, etc.

EXAMPLES OF "PATTERN" IMAGERY:



PERSPECTIVE

This lesson is an introduction to the study of Perspective. Structured as a tutorial, this computer program, with guidance from the teacher, adds content information and practice exercises. Computer perspective drawing is drawing with line and simple boxes in one and two point perspective. This program can be used on or off the computer (or both).

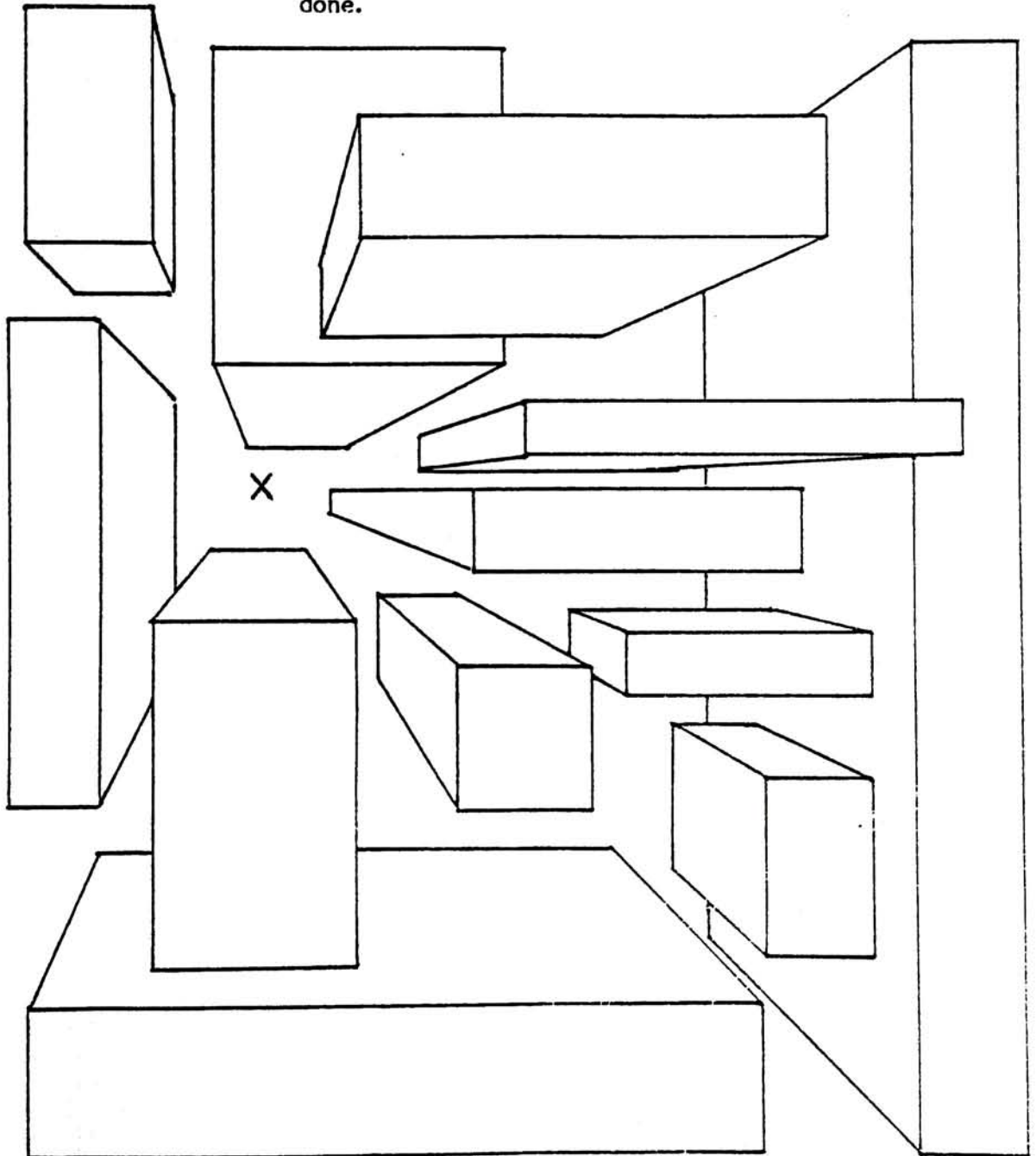
Accompanying the lesson, in the software, are sections that assist students in learning and recording new terms and definitions. The students are able to understand new subject areas, by resolving problems and redrawing what is seen on the screen. From this program perspective drawing can be taken and formed into other projects, such as room drawing, other shapes, and building drawing.

SOFTWARE SUGGESTION FOR USE:

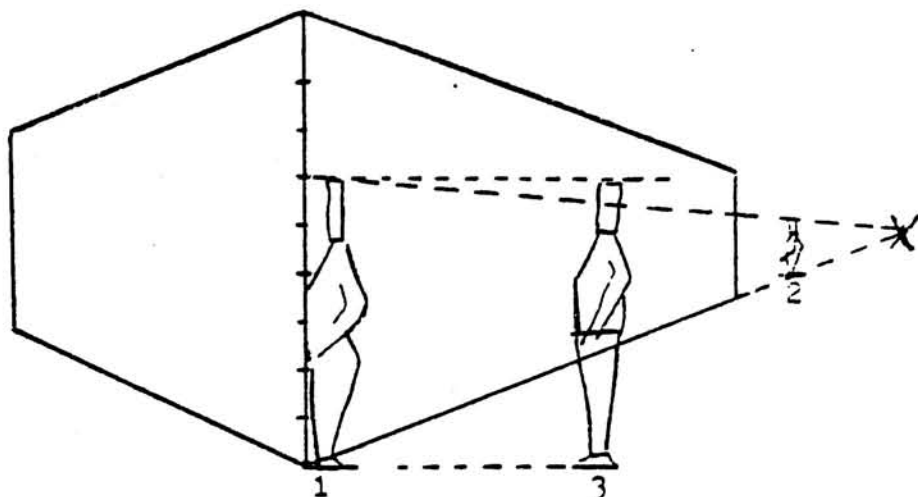
Art: Perspective Drawing

EXAMPLES OF "PERSPECTIVE" IMAGERY:(8)

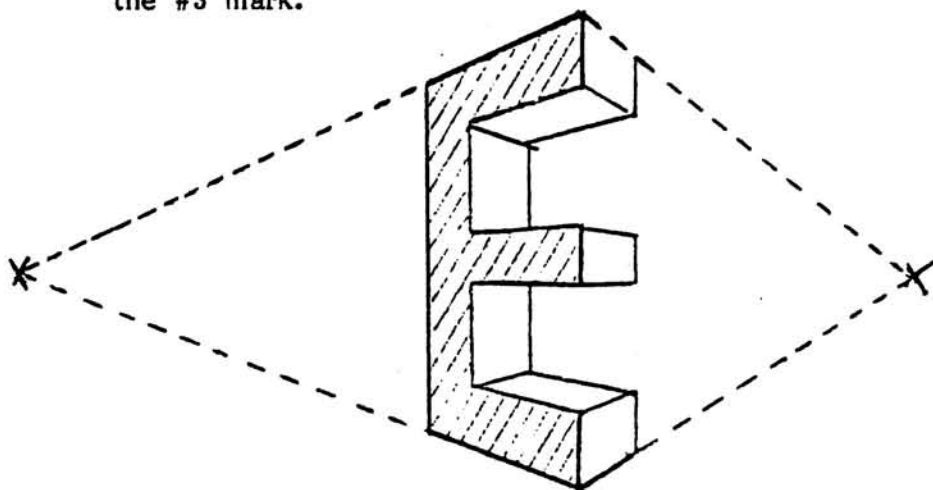
15. DRAW 12 BOXES IN ONE POINT PERSPECTIVE. Use only one vanishing point. Draw at least 3 boxes bumping or going behind other boxes. Use a pencil and straightedge for all lines. Erase guide lines when you're done.



X



18. Draw a measuring line on the vertical front corner of the building. Let each mark on your measuring line equal one foot.
19. Draw a simple figure in correct scale at the measuring line.
20. Draw a simple figure in correct scale with feet standing on the #2 mark.
21. Draw a simple figure in correct scale with feet standing on the #3 mark.

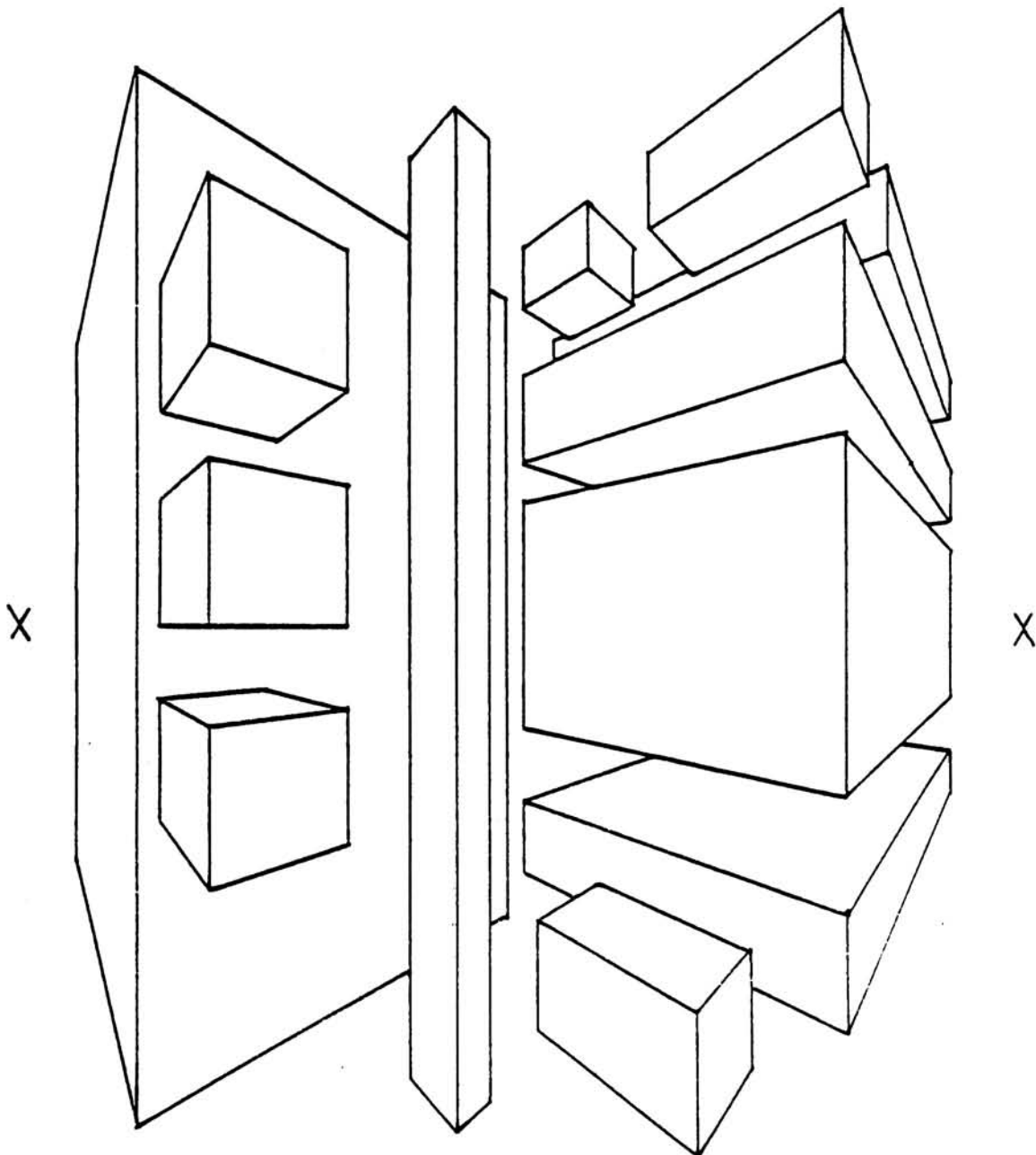


22.

22. Complete the drawing of the letter "E" in two point perspective.

AFTER COMPLETING THE COMPUTER PROGRAM, DO THE DRAWING ON THE FOLLOWING PAGE.

23. **DRAW 12 BOXES IN TWO POINT PERSPECTIVE.** Use two vanishing points. Draw at least 3 boxes bumping or going behind other boxes. Use a pencil and straightedge for all lines. Erase guidelines when you're done.



USE OF COMPUTER

Children are involved in the images they view on television. There are many images that are created on the highly sophisticated and powerful equipment. The purpose of a lesson on the computer is to show the children, and expose them to what computer graphics on the personal computer is all about. The differences between this imagery from the personal computers and the sophisticated computers has to be taught and realized at a young age level.

There are four parts to this lesson: Part 1, uses the game paddles for drawing purposes. The information needed to draw on the screen is typed in from the keyboard and the cursor is moved with the "joy stick". Part 2 uses the digitizer tablet for drawing. A good way to get a feel for it, is to let the children doodle. The best way to learn is by trial and error. The "mouse" should be used, to see how it works; by drawing circles and lines. On the Apples, there is an enlargement or zoom button, that should be looked at also. Part 3 uses the light pen. The pen works directly on the screen, it's the closest to painting on canvas that the computer can come. The introduction to the parts of the computer should be reviewed. Among the elements are: the screens, disc drives, keyboard, printer, and any other equipment that is present. Review of the software and the manuals of the modes of each function should be dealt with. Pixels are tiny dots of graphic imagery or the Picture Element. The more pixels the finer the image will appear or a higher resolution. On an Apple personal computer, the screen is made of about 280 x 192 pixels. The main colors are orange, violet, blue, green, black, and

white. Some of the modes involved in most software packages are the sketch, edit and pattern modes. Part 4 is the use of the Koala pad or a touchable drawing tool with a stylus, by creating pressure on the pad.

There are many aspects to be taught about the computer. Some of them include: how to create high quality graphics using paddles, digitizer, light pen, and Koala pad, to use computer menus in order to select mode wanted, techniques for detailed work, do's and don'ts of erasing, drawing modes, familiarization with tools for freehand drawing, to save and recall images, and others that have to do with software or equipment functions.

Most software manuals have tutorial exercises printed in them and there can be useful ways of learning a specific piece of software. There are also many other activities that can be executed with students.

1. Have them research and discuss T.V. computer graphics, how they are created, their similarities and contrasts to personal computers.
2. Demonstrate how you would execute a similar project, stressing the order in which you create certain elements of an image, overlapping parts and backgrounds.
3. Creating images and saving them onto discs; one freehand and maybe one digitized or technical.
4. The first thing you see is the main menu. Go through all it offers, the choices of each activity to choose from. All menus are different for each operating system, so you will have to review each one, and discuss them according to each machine used.

When using a personal computer, there may be opportunities that require something other than a print-out of an image. The most efficient way of accomplishing this is to have slides made. Therefore, the techniques of shooting off the screen have to be reviewed. It would be best if the teacher completes this part of the lesson until the ninth grade.

1. Use 35mm SLR camera
 2. Use daylight film- it gives the truest colors:
Kodak high speed Ektachrome for color slides-
ASA 64 or 100 or Kodachrome 64
 3. Always use a tripod
 4. Align film plane and screen plane parallel
 5. Darken the room or create a shadow box:
no reflections on the screen will maximize
image colors.
 6. Wear dark colored clothing so you don't reflect
off the screen.
 7. Set aperture.
 8. Check shutter speed (1/5th or below
to a second)
 9. Bracket your shots (one at correct
setting,
one higher, one lower)
 10. Shoot test roll, record everything
you do.
- EXPERIMENTATION MAKES PERFECTION.

TESTING, EVALUATION, AND CONCLUSION

"The high standards that are being aimed for in both fine and applied art stand a much greater chance of being realized by more people. Art, as part of a balanced education and not specifically for the specialist, will be that much more instrumental in helping the individual become more at one with himself and his environment."(8)

Computers offer another means to create. The advantages are different than any other traditional methods, just as the limitations are different. This new medium helps to broaden the high standards of Graphic Design to a faster and more controlled area, but includes everything that is completed with this new medium into the high standards of Fine Art.

The testing of this thesis was completed in the form of conducting workshops. The workshops were taught at the Geneseo Central School, in the month of March 1986. Four, fourth grade students were chosen to participate and complete the lessons that I reviewed and exposed to them. The imagery that they produced was then printed out and is included in this report, and also copies were given to the students.

The evaluation process was conducted in various forms. Preceding the first workshop, Teacher Jim Clark, reviewed the events that took place in his room. He helped in the elements that were made to be most important and the points that the children already would understand. The suggestions and opinions were taken and reviewed for the next meeting and the

points made helped the class to run smoother and for information to be grasped faster, therefore more activity took place. The students at this particular school, I felt as though they could have done much better work than they did for me. The fact that they only use the computer to play on may have had an effect on the results, but I still expected more than I received. Another form of evaluation was made by the students. After the last class, I sat with them and asked them if they would like to have lessons they were learning to be completed on the computer. Their response was that the only thing they do now on the computer is to play and that they thought they could learn more about art if they could use the computer also. I feel that the workshops were necessary to the completion of this thesis. They helped to show me what was important to a child and what they would understand.

In conclusion, I have found that there are many aspects that were not covered in this thesis. The time was limited, therefore the psychological attitudes and completed grade levels had to be reduced to a mention. The curriculum, I feel a well rounded coverage of the basic elements that should be taught in the elementary level. More time should have been spent with children, in other schools, maybe in other cities, where possible. Learning the philosophies and practices of teaching would have made the points brought up here more defined and factual, but I feel that with the background that I do have the points covered are very functional and likely to succeed with ease. One point

that I think should be included in any curriculum, is the introduction of note-cards. Making cards on each work and each lesson (children also make their own) to keep records for themselves and for reference for future activities. Notes on: museum visits, design techniques, architecture, prints, paintings, sculpture, computer imagery seen, etc.

The software that I researched was adequate for the purposes needed. Any additions to the list given here, I feel that it would be a personal preference for the teacher, or as new areas are added to the curriculum, the software will have to be re-evaluated and updated.

FURTHER RESEARCH TO BE STUDIED

This thesis is just the beginning of a very long project. With the incorporation of these computers in the education systems, I feel that most of the system has to be re-evaluated, modified, extended, and rebuilt. The Art curriculum is the one that has not been touched. All of the basic art principles have to be expanded to accommodate the new equipment, and most importantly to help it be the most efficient and effective that it can. In the education field, the most important element is the children. Students who receive this technology need instructors who can reach the systems to their fullest extent. Otherwise they will not receive the education to which they are entitled, and their future will be that much more difficult.

LIST OF TERMS AND DEFINITIONS IMPORTANT IN PLANNING

MOTIVATION:

inclination; clear understanding; interest

PERCEPTION:

observe; to be aware

ASSOCIATION:

grows from explorations

CONCEPTS:

expression of experiences and feeling; process

EXPERIENCES:

knowledge

SYMBOLS:

illustrations of knowledge, feeling, ideas

MEANING:

concepts are formed during process = add to meaning

MATERIALS:

manipulative process

FORM:

process of creating visual structures from concepts

TECHNIQUE:

process

INVENTIVENESS:

process

SENSITIVITY:

qualitative concepts

THINKING/FEELING:

feeling adds strength

ACTIVITY:

becoming involved; to help understand experiences

EXPRESSION/TALKING:

adds detail to complete concepts

DEVELOPMENT/SKILL:

sensitivity, characteristics

DRAWING =

interpretation of feelings and environment

CONSTELLATIONS =

previous experiences/more depth and detail

RATIONAL/EMOTIONAL/COGNITIVE =

precognitive thinking: blend of feeling and thinking

DESCRIPTIVENESS:

1. VISUAL

concern with what is seen; experience

2. HAPTIC

concern with feelings; emotional involvement

* each should follow the other

APPENDIX B
SELECTIVE BIBLIOGRAPHY

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APPENDIX C
SELECTIVE SOFTWARE BIBLIOGRAPHY

(All software is Apple II compatible)

1. Delta Drawing: Apple II Plus:
Spinnaker Software Corp., Cambridge MA.: 1982.
(written in Micro Motion Fourth-79)
2. Pen Painter:
Gibson, Steven M.:
Koala Technologies Corp.: 1983-4.
3. Koala Painter (Micro-Illustrator):
Dompier, Steven:
Island Graphics Corp., Koala Technologies Corp.: 1983.
4. Art: Perspective Drawing (No. 939):
MECC (Minnesota Educational Computing Consortium):
Instructional computing courseware for the Apple II:
Lexington Avenue North, St. Paul, Minn, 55112.
5. Complete Graphic Systems:
Pelczarski, Mark and Lubar, Dave:
Penguin Software: 1982.

Other software reviewed and tested but not used in curriculum:

6. Dazzle Draw
7. Apple Mechanics: "X-Typer"
8. Graphics Exhibitor
9. Fantavision
10. Blazing Paddles
11. Zoom Graphics
12. Graphic Magician

Computer Graphics Workshop: Spring 1986
Geneseo Central Schools
Coordinated through Jim Clark
Students: Shanah Alexander
Phillip Braccai
Adrian Braun
Mary Robinson

