ABSTRACT

The computer is becoming an important tool for the production of works of art. Art students are becoming increasingly interested in tapping the potential of the computer in the area of static and animated graphics. This paper deals with my personal experience in teaching art through computer graphics, at Syracuse University, to art majors and students from other academic disciplines.

A very exciting experience for me in the past two years has been establishing a computer art division within the department of Experimental Studies in the College of Visual and Performing Arts at Syracuse University and teaching a number of very enthusiastic students from a number of different academic backgrounds.

Students have access to the Syracuse University Computer Center, with the following hardware: an IBM 370 computer, the DEC-10 system with 128K core and a VB10-C display, two high speed line printers, six ADDS CRT terminals, 100 DEC writer terminals, a 14 inch Cal-Comp drum plotter and a 33" Cal-Comp drum plotter with three pens. Students may use these facilities in conjunction with the university’s video, film and animation studios. Art and science students have accepted the computer as a viable tool for the creation of art. Not all students have reacted positively, but the vast majority of students discovered a positively fantastic environment to create in, bringing together the blissful marriage of art and technology.

The computer may be the universal tool, not only a device for scientific and engineering progress, but a tool for artistic progress as well. The computer is malleable, like clay, making it a perfectly applicable medium for manipulation by artistic minds and hands. Naturally, the digital computer alone cannot create art. Artists need hardware and software they can understand. Fortunately, there have been a number of ingenious software systems designed for them. The two principal systems that most of my students use at this time are MINI-EXPLOR and PSPLAT.

MINI-EXPLOR was created by Ken Knowlton and the name EXPLOR stands for the production of images from Explicit Patterns, Local Operations and Randomness. MINI-EXPLOR is a FORTRAN coded version of the EXPLOR language which allows the student to become familiar with many of the FORTRAN language subprograms and other FORTRAN details from a graphical point of view. The paper output is 132 spots wide by 140 lines long. The display output is 1024 points x 1024 points using run length vectors which are multiply interlaced. Each individual image can be produced as many times as the artist wants and each individual point or area of points can be changed explicitly or changed randomly by the student’s program. There are also subroutines which allow for growth and combination patterns. The graphic output produced on unlined white paper is immediately suitable for framing and editions can be run off in a matter of minutes. In addition, other media such as paint, pastels, different colored line printer ribbons and photography can be combined with the graphic output to bring the images into yet another visual plane. Taking a photograph of the printer output image, developing the negative, making a kodalith from the negative and applying that to the production of a photo-silk screen, photo-lithograph or photo-etching have produced dramatic and colorful prints.

Images generated on the display can be filmed in single frame to produce an animated sequence. The film can then be placed in a film chain in the television studio and these images can be manipulated through the special effects generator, resulting in a color video tape which can then be kinescoped if desired.

Some students prefer to generate sequential images on paper output and single frame each image in our animation studio using the Oxberry animation stand. The advantage of this technique is that the artist can add hand-done animation to the computer graphic, adding other media and images as well as color, giving surprisingly unusual results.

MINI-EXPLOR produces output in four level grey scale. The total grey scale in a single image is easily

* Rather than the conventional video scan-line ratio of 1 to 2, this system uses a ratio of 1 to n.
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separated into three images containing one grey level each, with a simple program, allowing the student to add optical color through filmic techniques to his or her animated sequence.

In addition, MINI–EXPLOR designs are beautifully suited for making rugs, weavings, textiles, needlepoints, collages, and relief sculpture.

I have found that in the beginning of my course those students who have a background in FORTRAN and mathematics, usually the computer science and engineering students, are able to produce more interesting designs with greater facility than the art students, who usually have not more than one year of high school algebra and no programming experience. Eventually, there is a leveling off point and then art students begin to excel.

In the second semester of the course art students reach a point where they can begin to use the language effectively enough to establish a personal style. With MINI-EXPLOR this often requires the creation of the student’s own subroutines and the delineation of a clear and purposeful aesthetic concept. Even then the imposed stylistic format of the software gives the work a certain ‘EXPLOR’ character but this becomes less important if the concept is strong. The hardware also contributes a stylistic character to the output but the artist is free to mix media and in this way, if he or she wishes, can effectively eliminate any reference to the software or the hardware to suit the aesthetic concept.

Two other factors that students can capitalize on when using MINI-EXPLOR are the built in random number generator and the ‘expand’ program which was written by David Carr, a computer science major, at Syracuse University. First, the random number generator activated by the MINI-EXPLOR function NE (Min., Max.) used in a program can lead to interesting designs not necessarily predictable in advance. Here the art comes in by making the right choice of what works and what doesn’t work in the final image. Chance has often played an important role in artistic creation and can be used as a valid parameter in creating a work of art.

Second, the ‘expand’ program enables the student to enlarge his or her line-printer image to any proportional size by joining the side edges of the standard line-printer paper together for the increased width. The only limiting factor is how much paper is available. This property adds an exciting new dimension to the MINI-EXPLOR system and to computer graphic art in general. One advantage of our MINI-EXPLOR system is that for a non-real time system, it is fast on returning images. This is very important in teaching traditionally trained art students who aren’t used to waiting around to see what they have created. Using TTYOUT, the DEC-writer terminals return the hard copy image almost immediately so the art student can make the necessary visual critique of the work and proceed to modify the results through further programming or by hand. Designing on a display is even faster, waiting on line for over an hour for a printout is very bad and quickly discourages the creator.

I have found that art students who enjoy writing programs tend to stay with MINI-EXPLOR and desire to delve deeper into how the total system works from a programming point of view. MINI-EXPLOR motivates art students to want to create their own language for their own personal visual statement and gives science students an opportunity to apply his or her previously acquired programming skills for a purely aesthetic purpose. The science and engineering student is able to create visual images, using a familiar medium which relates directly to his educational and personal experience, without spending long amounts of time trying to master a traditional art skill which requires the traditional art talent. By this method the aesthetic experience has a direct transfer to the student’s daily technological involvement.

MINI-EXPLOR is also an excellent software system to teach FORTRAN programming graphically to anyone.

PSPLAT is a FORTRAN program written by Richard H. Blocher of Washington University, St. Louis, Missouri, and more or less simulates another program, SPLAT, which was written for artists by John E. Skelton and Daniel J. Donohue at the University of Denver. SPLAT stands for Simplified Programming Language for Artists.

PSPLAT (poor man’s SPLAT), is a simple non-numeric computer language which is an excellent software package for introducing art students to computer graphics and should be used as an introductory course. The language uses statements composed of words which the artist can understand in terms of non-technical language. Everything is categorized by commands under headings like Creation, Manipulation, Looping, Branching, etc. which eliminates the need for the art student to go through tedious programming details. The output is principally by cal-comp plotter but we have output on our display as well, and this system has animation capabilities. We run PSPLAT by batch on the IBM 370 computer and MINI-EXPLOR on the time-sharing DEC-10 computer. This gives the art student the experience of using both types of systems. With PSPLAT the art student is working with a pre-defined symbol, such as a circle, square, polygon or line and draws and manipulates these symbols by writing a program, which is closer in concept to the way a traditional drawing is made. The art student can often visualize his or her final design in his or her ‘mind’s eye’ making the process very comfortable for the student and a friendly rapport is established quite rapidly between the person and the machine.

In many cases the designs generated with PSPLAT are extremely complex and would have taken much
more time if they had been executed by hand. The creator is thereby freed from doing the work and has more time to devote to thinking about developing new concepts for design possibilities. What often results is that the final images would not have been possible using traditional media.

I call PSPLAT a closed system because it doesn't lend itself easily to change by adding additional subroutines. MINI-EXPLOR, on the other hand, is an open system and encourages the addition of subroutines.

What is remarkable about using PSPLAT is that art students have been able to develop individual styles fairly quickly and neither the software nor the hardware has greatly hindered this stylistic development.

As I mentioned before, art students who turn on to programming in FORTRAN and get aesthetic satisfaction out of the programming challenge continue working with MINI-EXPLOR. Students who prefer a more traditional output continue with PSPLAT, and some art students choose to work with the system which can best provide the desired results for their aesthetic concepts.

The limitations of the software and hardware have not greatly hindered the development of individual style and the results can or cannot have a computer-made look, depending on what the artist wants. All media and materials impose certain limitations on the artist in the same way that the computer does. Whether the visual images generated by a computer system will ever constitute a major art movement remains to be seen. But when the artist transcends his media and materials with his unique personal vision and strikes human chords of sensuality, existence and human essence, we get art. I believe a number of my students have created art with the computer and this strengthens my belief that the computer is the most important technological achievement that has been made for the arts and will affect the course of art greatly in the future.

There is still much to be done in terms of hardware and software for the arts. Computer systems have to be designed to respond with greater sensitivity to the artist's sensitivity and expectations. I believe, at this time, that the major interest in computer graphic science is in the area of moving graphics for film and video, but static art is still the major movement in the art world and computer graphic science can contribute greatly to the future of static art images.

Artists are always searching for new forms and new ways to express their visual concepts. To use the familiar pleases the masses and saddens the individual. I believe the computer has the potential to provide new ways for the artist to create new forms, and I am looking forward to the computer becoming a standard studio tool for the creators of the visual image.

Figure 1—David Cox, “Pouring In and Out,” 14” x 20”, photo-etched intaglio, PSPLAT, IBM-370, Cal-Comp Plotter.

Figure 2—Ella Mears, “Eyes,” 10” x 10”, PSPLAT, IBM-370, Cal-Comp Plotter.
REFERENCES

Blocher, Richard H., *PSPLAT*, Washington University, St. Louis, Missouri.

Figure 3—David Cox, "Great Multiple Circles," 10" x 18", PSPLAT, IBM-370, Cal-Comp Plotter.

Figure 4—David Cox, "Cosmo," 10" x 12", PSPLAT, IBM-370, Cal-Comp Plotter.

Figure 5—Susan Sirkus, "Woven Tapestry," 20" x 36", DEC-10, After EXPLOR lineprinter graphics, five colors, wool.

Figure 6—Don Leich, "After Mondrian," 14" x 18", MINI-EXPLOR, DEC-10, lineprinter.
Figure 7—Don Leich, “Where Am I Going—Where Have I Been,” 14” x 18”, MINI-EXPLOR, DEC-10, lineprinter.

Figure 8—Ella Mears, “Crazies,” 10” x 10”, FSPLAT, IBM-370, Cal-Comp Plotter.

Figure 9—Bruce Maccurdy and Joseph Scala, “Strutting Through Computer Space,” 8” x 10”, mixed media, EXPLOR, DEC-10.

Figure 10—Joseph Scala, “Exploring II,” 40½” x 52½”, EXPLOR, DEC-10, lineprinter, acrylic paints.

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