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ABSTRACT

This master's thesis provides an overview of a computer graphics production environment and proposes a realistic approach to orientation and on-going training for employees working within a fast-paced production schedule. Problems involved in meeting the training needs of employees are briefly discussed in the first chapter, while the second focuses on the stages in computer animation production, including client contact, design, data generation, motion definition, color and lighting, calculation, recording, and client communication. In the third chapter, the levels of training required are defined for participants in the production process--clients, sales representatives, production coordinators, designers, animation staff, and hardware and software staff. Current training practices in six computer animation production companies are outlined and compared in the fourth chapter, and the fifth describes the personal experiences of an educational coordinator within a computer animation production company, including introductory workshops, production workshops, group viewing and discussion of work in progress, and leased software instruction. A structure for the orientation and training of corporate support staff, production staff, and clients, is proposed in the sixth chapter, and the final chapter presents a summary of the employee's responsibilities in computer animation, incentives for employees to continue attending training, and the responsibilities of the educational coordinator. Four references are listed. (MES)

COMPUTER GRAPHICS ORIENTATION AND TRAINING IN A CORPORATE/PRODUCTION ENVIRONMENT

A Thesis

Presented in Partial Fulfillment of the Requirements for the Degree Master of Arts

by

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The Ohio State University
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THESIS ABSTRACT

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Computer Graphics Orientation and Training
in a Corporate/Production Environment

This thesis provides an overview of a computer graphics production environment and the role of an orientation and on-going training program within it. Identification of selected participants, structure of an internal training program, utilization of professional seminars and conferences are outlined and discussed. Experience by the author as an educational coordinator within a computer animation production company is described. Comparisons of companies' approaches, specific to employee orientation and continued instruction, are reviewed for the development of a training model and its implementation.

Thomas E. Linehan
Advisor's Signature

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CHAPTER 1

Introduction

This report details experiences acquired as an animator, an educational coordinator and a production coordinator at a computer animation production company. The overview, observations, and experiences discussed in this thesis have taken place within this environment. The thesis describes the production process and the participant's roles within the process. It proposes an orientation and training structure within a computer animation production company for staff at diverse levels.

A brief overview of the production process is provided to familiarize the reader with the environment. If the reader is not familiar with the terminology, techniques, and other basic concepts of computer graphics a number of texts may prove to be of value. "Principles of Interactive Computer Graphics" by Newman and Sproull [2],

and "The Basic Concepts Of Three Dimensional Computer Graphics For

Artists" by Judy Sachter "Introduction to Computer

Graphics" [3] are recommended.

Orientation training and education are a necessity for a new employee regardless of profession. The level of detail for such training is dependent upon the complexity of the job requirements and the previous experience of the new employee.

The orientation of an employee to a computer graphics production company varies from one company to another and according to the role the new employee will take within the production process. An understanding of the production process is important for every employee. An overview enables the new employee to understand the affect his/her particular role has on the overall process. Printed material including rules and regulations, and step by step procedures provide the new employee with valuable information independent of the time spent during training.

Computer generated graphics and animation production companies that support their own software and hardware engineering staff create an environment that is growing and changing at a rapid pace. Their employees need a

structured environment for learning the new and changing tools in order to remain productive. Manual documentation, seminars, and tutorials all aid in the level of comprehension that the employee will attain.

These employees also require adequate exposure to current research and development within the field of computer graphics. It is important that the appropriate research literature is available. Information pertaining to conferences and seminars should also be available. Employee representatives should attend the conferences which pertain to their particular area of research.

The realities of new employee orientation within a production environment result in some employees spending less time with the educational coordinator. These employees are needed on productions immediately and have to learn the process as they proceed through the production. The structure for training discussed within this thesis attempts to present a realistic approach to orientation and training within a fast paced production schedule.

CHAPTER 2

Overview of the Production Process

The specifics of the production process vary from one production company or computer animation company to another. However, the procedural concepts and the goals, specifically the quality of the final product and product delivery dates, remain the same. This overview is based on the experience and observations the author has gathered working at a computer animation production company. Some of the information is specific to the process of this one company.

Regardless of the company, computer animation requires the same basic approach to its production. The order of the events may vary from one animator or company to the next, but each stage is experienced by all the major computer animation production companies. The stages include: Client contact, Design, Data generation, Motion definition, Color and Lighting, Calculation, and Recording.

2.1. Client Contact

Initial contact with clients usually takes place with the sales representatives. This contact may begin with the sales representative placing calls either to the client or to the client's advertising agency. Often the client initiates the contact to the computer animation company either because they have seen the company's work, or because they have been referred by their previous clients.

Once contact is made the sales representative will either arrange an appointment with the client to present the sales demo reel, and the process demo reel, or the tapes will be sent via mail and discussed over the phone.

2.2. Design

2.2.1. The Concept

2.2.1.1. Pre-Defined

If the client considers working with this company the next stage depends on whether a pre-defined idea or

storyboard already exists. If a storyboard has already been approved with the client through an advertising agency, the computer animation company will review the board for feasibility and cost analysis.

Often the company will suggest enhancements that will take advantage of the 3-dimensional ability of computer animation. This may require a newly rendered storyboard from the company's design staff. The design staff work closely with the animation and software staff when developing and rendering storyboards for computer animation.

2.2.1.2. New Design

If the client does not have a pre-defined storyboard the designer will develop one or more ideas and render storyboards within the constraints of the clients budget.

2.2.2. Storyboard Definitions

The definition of the color scheme, the number and complexity of objects, and approximate timing for the motion are developed in the storyboard stage.

2.2.3. Storyboard Competition

The storyboard is presented to the client for approval. Often the storyboard is in competition with storyboards from other production companys. The decision on awarding a contract is often based on this competition submission of storyboards. If the client suggest a few changes in the board, either a new board will be rendered, or notes concerning the suggestions will be attached to the storyboard for production.

2.3. Data Generation

Once the final storyboard has been approved and the client has signed a production contract, the animator begins to create the objects that will appear in the animation. The objects that appear in the animation are referred to as data, and the specific process required to generate the data depends on the nature of its shape.

A large percentage of commercial animation has a logo as part of the data. Programs specific to creating logos have been developed to accelerate their generation. The

programs enable the animator to create 3-Dimensional logos that are either a combination of tubular shapes, or straight block-style projections either with or without bevels.

The data is represented within the computer as a set of numbers defining points and polygons on the x, y, and z planes. Animators no longer need to create this list of numbers by hand, instead they use the automated programs at a digitizing tablet.

symmetrical objects can be created within these programs quickly, but natural non-symmetrical organic shapes are very difficult and require a long period of time.

2.4. Motion Definition

Once the data for the animation has been generated the animators are ready to begin setting up the motion. Most companies have calligraphic display machines with software that allow the animators to define events to occur on specified frame numbers. The software will interpolate between the specified events to create the

motion. The animators refer to the keyframes from the storyboard and arrange the objects and viewpoints in similar positions and rotations. It is not realistic to assume that the animators can input each keyframe from the storyboard into the animation system and achieve smooth motion. Therefore, they use the storyboard as a guide but may need to vary the timing. The reason for this is that the designers have documented changes in the action on the board, and often the frame numbers do not correspond with even increments of time. The animators will enhance the motion concepts from the storyboard and adjust any inaccuracies that may exist.

In many production companies a vector motion test is sent to the client for approval before the time is taken to start color and lighting tests. The vector test allows the client to view the objects in motion. The client and animators can view the objects moving in real time. Minor changes in the objects' motion can be adjusted at this time after studying the vector test. The problem with this process is that it is very difficult to perceive depth in vector or line form. Many people are not accustomed to interpreting line drawing representations of solid objects.

Some calligraphic display devices available allow the animators to define color to the vectors, remove hidden lines, and display with depth cueing. These devices are recommended for clients unaccustomed to viewing motion in line form. However, the impression of the timing and motion can still be achieved with the standard black and white calligraphic display, and it a very useful tool when the color devices with depth cueing are unavailable.

2.5. Color and Lighting

2.5.1. Surface Attributes

Color and Lighting include the available surface attributes for the objects and the overall color and lighting control of the scene. The animators use the colors defined on the storyboard and/or PMS colors as a guideline for color selection. It is often very difficult to match the colors due to the difference between mixing colors with paint and mixing colors with light. The computer animators' primary colors are red, green, and blue. Some colors are more easily achieved than others and

the animator must constantly double check the colors on an National Television Standard Code (NTSC) monitor if the animation will be aired on national television. Often colors are slightly distorted when converted from Red/Green/Blue (RGB) to NTSC.

The objects can be defined as dull, shiny, transparent, opaque, single or multi-colored, to simulate surfaces such as metal, glass, and plastic. The shape of the object and pre-definition of the environment from the storyboard partially controls the input parameters for these attributes. The animator can control the degree to which and object is shiny, transparent, and opaque. The size of the highlight; the amount of light that passes through the object; and the position and number of light sources are all controlled by the animators' commands.

2.5.2. Low Resolution Color Motion Test

Once the animators have each of the object's attributes assigned, a color motion test is calculated on the computer. These tests are calculated at a lower resolution than the final animation. The lower resolution enables the animator to view the objects, with their

surface attributes, in motion at a lower cost in terms of computer time. When the animation is viewed in lower resolution it appears blocky or 'pixelated'. This is due to the fact that the viewpoint zooms into a small portion of the screen and individual pixels are revealed.

The client views the low resolution, color motion test and several full resolution color still frames for approval. These test enable the client to view the objects surface attributes in motion and the interaction of these objects with their environmental lighting. The placement and motion of highlights, shadows, and the transmittance quality becomes apparent in the color motion test. If the client likes the tests the animators prepare for the final calculation at full resolution. If the client suggest changes the animator will either incorporate the changes into another color motion test for another client approval, or incorporate the suggestions as part of the final full resolution calculation. Naturally, changes are restricted to suggestions on colors and subtle changes in motion.

2.6. Calculation

If the final animation is to be recorded on film the animation is calculated and motion defined at 24 frames per second. The animation is also calculated at a higher resolution for large screen projections when recording to film. If the animation is to be recorded on video, it is calculated and motion defined at 30 frames per second.

The animation may be calculated as one single composited frame of the entire scene or calculated as separate layers and composited in recording. The layering method allows the animation to calculate faster if there is a large, non-animated background. The background is calculated only once and saved. The foreground images are then calculated in a separate layer and later composited over the stationary background.

2.7. Recording

If the animation has been calculated in one pass as a composited scene, recording simply requires showing the image and recording it to an electronic still storer

(ESS), which converts the RGB information to NTSC, when dumping it to video tape. The ESS enables the animator to playback the final frames as soon as they are recorded. This can be done either one frame at a time or in real time. This is much faster than waiting for film to be developed. The single frame playback mode enables the animator to quickly check for bad frames on an individual basis. The animation, when recorded on video, may be dumped to tape in single frame or double frame mode, and/or forward and backward playback. Looping the animation is also taken advantage of when the animation is stored on the electronic still storer and dumped to tape. Naturally, the looping feature only works when the animation was designed with a loop in mind.

If the animation is to be recorded to film, it is first recorded on the ESS to check the animation for bad frames. If there are bad frames they are recalculated and recorded again. Once the animation has been checked it is then recalculated at a higher resolution and stored in the film recorder's format. It is then recorded on film.

If the animation has been calculated in layers, the final recording remains the same but there is a

intermediate step of compositing between calculating and recording. The compositing method layers each component of a single frame together and saves it as one single image. These single images are then recorded.

2.8. Client Communication

Throughout the production the production coordinator and animators talk with the clients and document their correspondence. The production coordinator arranges conference calls, insures that the animation meets the contract requirements, helps the animator with one or more of the production stages, arranges for software staff assistance when needed, and works with the animators to develop and meet a production schedule.

The production schedule is arranged by the production coordinator and verified with the client and technical staff. If a problem arises during the production the production coordinator gathers the appropriate staff for a meeting and/or conference call with the client. The coordinator will monitor the project to see that it stays with its budget, meets the requirements of the contract,

and meets it delivery date.

CHAPTER 3

Identification Of Selected Participants

Through the production process overview it becomes apparent that everyone involved in the production should be knowledgeable of the work of all the other participants. All participants in the process have their specific role which directly affects the work of the others.

The level of training required for each of the participants varies relative to their role in the production process. The selected participants include: clients, sales representatives, production coordinators, designers, animation, and hardware and software staff. The author's emphasis relates to the training of the clients, sales representative, production coordinators, and the animation staff. Although the training and orientation of the software and hardware staff to the production process is equally important, the areas specific to their software responsibilities should be handled by the director of software. The author's background and role of education coordinator does not qualify for software personnel

orientation.

3.1. Clients

Computer Graphics is a recent media for the advertising industry to incorporate into their commercials. Since computer generated animation is still a relatively recent technology, the advertising agencies are just learning how to utilize these processes into their designs. Often they are not aware of the research that is taking place in computer animation, and they are unaware as how to incorporate these techniques into their productions.

Some advertising agencies suggest that computer animation production houses send recent demo tapes to them on a regular basis. If a production seems appropriate for computer animation the advertising agency will review the tapes and select a company for production.

The level of detail required in the information provided to the client concerning the production process is much different than the level required for the production staff. The client's interest is centered around

what computer animation can do for their production. The client wants to know what to expect from the computer animation company at each stage of the production. The general concepts of the design process, data generation, motion testing, color and lighting and calculation and recording need to be reviewed for the client. When the client has a general understanding of what to expect from the computer animation company then they will know how to plan the other activities associated with the production (for example, scripting and scheduling air time).

When the client is provided with an overview of a production, they then are able to associate the motion tests with the quality of the final animation. It is still difficult to assure clients working with computer animation for the first time. When they are viewing an extremely rough low resolution color motion test, they become concerned about the quality of the final animation.

It is common for the client to suggest minor changes in the animation. It is the responsibility of the computer animation company to inform the client from the beginning when the last date for input is possible. The clients need to understand that there is considerable expense in

calculating the final animation at full resolution. They must understand that all of the changes that they make in the animation should take place at the testing stage. They should also realize the limits to their suggested changes even in the testing stages. For example, the client needs to realize that the basic design of the animation can not be changed because of the time required to create the data and set up the motion. A change introduced after final calculation has started, could result in the client missing a desired deadline and increase the cost of the original contract.

An analogy is often presented to clients when they suggest major changes very late in the production. After a certain point major changes in the animation are similar to deciding to changing the actors, script, and stage set, the night before an opening performance in the theatre.

One goal for providing the client with an overview of the production process, before they start working directly with computer graphics, is to alleviate some of the frustrations. Frustrations result when the client is uninformed about the process and has unrealistic expectations of the computer graphics production company.

3.2. Sales

The first encounter for the client and/or advertising agency with a computer animation production company will often be through a sales representative. This introductory presentation to computer animation from the sales representative could result in either a positive or negative decision for the use of computer animation in a given project.

It is vital that a sales person knows the product. The sales representative should be able to answer some of the technical questions for the client. A clear understanding of the technology and production process enables the sales representative to answer these questions.

Understanding cost analysis procedures is important to the sales person in order to participate in the bidding process. For example, the correlation between object or motion complexity, labor cost, and profit margin, determine the cost of the production. The sales representative also needs to judge whether or not computer animation is appropriate for the client's production goals

and budget. For example, the production company may not have the technology to simulate the atmospheric conditions, or realistic representations of organic materials that the client desires.

3.3. Design

The designer's perception of computer animation and its capabilities has a direct effect on the storyboards which they produce. When the designers create an idea for a client they must be aware of both the limitations and the capabilities of the animation system. Labor and computer expense must be considered for the various features in the animation system in order to design a storyboard consistent with the client's budget restraints.

An understanding of the mathematical perspective, the surface attributes of objects and the proper use of timing, motion, and 3-Dimensional space should be present in the storyboard.

The designers need exposure to new software developments in order to incorporate the research into a storyboard design. For example, if software for animating

characters with articulated motion has been developed, and the designers are not aware of it, then it is not likely that it will be incorporated into an animation design.

3.4. Animation

The knowledge base for traditional animators, and for computer animators is similar. An artistic background covering the elements of design, composition, balance, and color is a prerequisite for all computer animators. Computer animators also need an understanding of the principles of animation. For example, the principles defined by Frank Thomas and Ollie Johnston in Disney:The Illusion Of Life [4]. General filmic techniques for lighting and staging are incorporated into the animation by the computer animator.

The animation staff of a computer animation production company need a working knowledge of their system in order to work efficiently and effectively in the environment. The computer programming background of the animators helps them to understand both the function and

limits to the software. When the animator is confident with their understanding of the system they become more creative problem solvers. It is difficult to create an effective animation when first learning the system. The beginner is often more concerned about the specific commands, and becomes frustrated trying to achieve a specific look or effect.

University programs which provide an overall education for the computer animator are available. Information pertaining to the curriculum of these programs is discussed in Design Curriculum Considerations For A Computer Graphics Program In The Arts. [1] It is not the always the role of the computer graphics company to educate the artist to become a computer animator. The degree of previous computer knowledge required by animators is dependent on the philosophy of the company. Some company's prefer animators with a joint background in computer science and fine arts. Others prefer that their new animators have no previous computer experience. Regardless of the animator's previous computer experience, it is the responsibility of the company to provide new animators with an orientation to the production environment. After the orientations all animators should

be kept informed on local software developments and provided with adequate exposure to research and development within the profession.

3.5. Production Coordinator

Production managers, producers, or production coordinators may have varying titles in various companies, but their responsibilities are generally the same.

The production coordinator coordinates communication between the production staff and the client once a project is under contract. The production coordinator updates the clients throughout the production. The transaction of information and tests between the production staff and client must be coordinated through the production coordinator . Therefore, the production coordinator must fully understand the information the production staff is conveying and to communicate it, if necessary, in further detail to the client.

The client may have questions; the production coordinator is responsible for providing the answers. Usually conference calls and meetings are arranged in

which the client can directly address concerns to the production staff. Often the client feels more comfortable speaking directly to the technical director of the production and the production coordinator insures that all of the client's concerns are clearly discussed.

Documenting correspondence is another important aspect of the production coordinator responsibilities. This requires an understanding of the computer graphics terminology and techniques in order to clearly document the stages of each production. Many companies promote from within to insure that the production coordinator has an indepth understanding of the process and product. When an animator is promoted to production coordinator, the necessary background for creating animation correlates with the prerequisites of producing. The production coordinator must develop managerial skills and the ability to discuss technical information in layman's terms with the clients. Understanding television terminology and video techniques enables the production coordinator to discuss some of the specific concerns of the clients. For example, the production coordinator should know the elements of a graphics packages including action windows, bumpers, and legal logo identifications.

3.6. Hardware and Software Engineering Staff

The software staff is responsible for researching and developing the computer programs which will later be used by the animation staff to create animation. Knowing both existing and needed programs enables the software staff to focus attention accordingly. The educational process of the software engineer requires constant research in the field of computer graphics. It is assumed that the software engineer has previous experience in computer graphics programming. An orientation is required both to the operating system and programming standards of the company and to information pertinent to the available equipment.

It is important the staff have access to equipment manuals, professional journals, periodicals. They should also attend conferences which pertain to current research and development.

CHAPTER 4

Current Practices For Training

Information concerning the current practices of training in computer animation production companies, was first attempted by mail. Six companies were contacted. The intent of the study was detailed in the original letters and information requested relative to training procedure. One phone call was received in response. The following information was gathered through candid phone conversations and through production company visits. Most of the contacts were with animators, therefore, the focus of the information is on the training of animators. Much of the information is brief due to the competitive nature and proprietory interests of the production companies.

4.1. Company A

Company A is a company of 35 employees with a separate staff of designers, animators, software and hardware engineers. I am currently employeed at this company as an educational coordinator. My responsibilities

include organizing workshops, manual documentation, and new employee orientation. The new animators that are hired at this company have experience with computer animation and usually only require an orientation to the programs and equipment specific to this company.

The new animators are provided with a one to two week intensive orientation. The orientation covers the details of the production process. The new animators learn the company's specific approach to creating data, defining motion, assigning color and lighting parameters, calculating the animation, and recording it to video and film. After the orientation new animators are assigned either to a simple production and have an assistant, or function as part of a group project. Once animators are involved in production, they have the entire staff available for questions and assistance.

Workshops and tutorials are organized when new software is developed. The software staff present new programs at these workshops and the animation staff is given an opportunity to suggest enhancements to the software and to ask questions.

The documentation of software is kept up to date. An attempt is made to write the documentation in a very descriptive style with examples. These manuals are available in notebooks located throughout the company and on the computer system.

4.2. Company B

Company B is a small company with fewer than 10 employees. The staff has many daily contacts. Exchange of information is generally through word of mouth. The company's software does not change at a rapid pace and documentation from several years back is an adequate supplement to the word of mouth information exchange. If a new software program is developed it is usually a special purpose program for a particular production and generally is never used again. Therefore, it is not necessary to teach anyone else how to use it.

This company feels that it is best to hire artists without computer experience to train as computer animators. The company believes that an animator without computer experience can better communicate with the

client. The company also believes that very little production process information should be explained to the client. They feel that the client does not really want to know all the technical information. Overwhelming the clients with technical information will cause them to view the computer graphics company (in the words of one company employee) "as a bunch of computer nerds".

4.3. Company C

Company C is located in an area where the universities are just starting programs in computer animation for artists. They therefore, have taken on the tasks of educating the artists "in house" to become computer animators. This process requires that the new animators work in an apprenticeship with experienced computer animators. This apprenticeship can last up to six months, until the new animators are knowledgeable about the animation system.

Each project is a team effort involving several animators, producers, production mangers, software assistance, and technical directors. The training of the

animators continues as they work with programmers and other animators on each project.

This company does not develop all of its own software. It takes advantage of research taking place at other facilities and leases some software. When such a lease is initiated the company leasing the software supplies an educator to teach Company C how to use the software.

4.4. Company D

Company D is not a production company. It does however hire new animators who require an orientation. Unfortunately, this environment is similar to many which provide the new employee with a limited amount of available documentation. It is through the very determined independent efforts of the new employee that the system is learned. Company D. provides the equipment and the exposure to other employees and it is the responsibility of the new employee to seek out the necessary information.

4.5. Company E

Company E is just starting, and is very small with fewer than 6 employees. The company is leasing equipment and software from a larger company which specializes in software leasing. The larger company sponsors seminars for prospective leasees at an additional cost to learn how to use the equipment and software. Company E sends a few representative animators to the seminar to learn how to use the software. These employees will then upon their return to the company teach other animators how to use the software.

4.6. Company F

Company F is also a small computer graphics production company which specializes in commercial productions. The company usually hires animators with an joint background in art/design and computer science. The new animators function in an apprentice structure with a supervising animator. for their first three to four months. There are 10 animators in this company with four

to five acting as supervising animators. Only tow of these supervising or senior animators are involved in the apprentice orientation and training of the new animators. After the early apprenticeship the new animators work on a less demanding production that maybe and a supervising animator is assigned to them. All projects have supervising animators assigned to assist the animators with technical and artistic decisions. The computer science background helps most of their animators to adapt quickly to the new environment. These animators are often involved in the development of software to enhance the production process.

4.7. Comparisons

Although each company has developed its own approach to the orientation and training of their new animators, only Company A has made a commitment to hire an educational coordinator. Company F has supervising animators. The new animators in these companies become independent animators in a shorter time period. The time invested in the beginning with orientation and training of animators saves the company time in the long run.

Most companies seem to agree on the validity of the apprentice approach. The new animator learns the practical day to day responsibilities of production. The apprentice relationship exposes the new animator to the more experienced animator's approach to problem solving within the animation system. This approach is an invaluable experience for the new animator, however, it takes a great deal of time and patience from the experienced animator. The experienced animator describes each of their actions as they begin to work together. After several weeks, the more experienced animator will suggest portions of the project for the new animators to work on. Not all of the experienced animators will be right for the apprentice relationship, and the company's management will quickly learn which employees work best with an apprentice.

The apprentice should be encouraged to suggest what their approach might be. The more experienced animator must emphasize that their approach is what works best for them, and the new animator should experiment with different approaches.

Although Company C and Company E both lease software there are different methods of training provided by the companies leasing the software. The company that Company C leased their software from sent an educational coordinator. The company that Company E leased their software from is much larger and provides seminars that the leasees are to attend. Both companies send representatives to the workshops to learn the software usage, and then these representatives are responsible for teaching the remaining staff.

Regardless of the specific company, all new employees receive some orientation to the production process. The quality and delivery of the information has a direct affect on the comprehension of the new animator. The communication skills of the person training the new animator must be clear and direct. It is these same skills that the animator must develop when communicating with a client. Each company recognizes that some employees have more developed communication skills than others. In companies without an educational coordinator, these employees are normally responsible for new employee orientation.

CHAPTER 5

Experiences Of An Educational Coordinator

When the author started working for a computer animation company part of the responsibility was to coordinate educational activities. This chapter describes the experience gathered during the past twenty months of coordinating orientation and training workshops. The experiences discussed in the chapter include: introductory workshops, production workshops, Friday afternoon videos, and leased software instruction.

Experience gathered from individual orientations of new animators is not discussed in this chapter. However, it is incorporated into the development of a proposed structure for training in Chapter 6.

5.1. Introductory Workshops

I first began a series of introductory workshops on the production process with the sales staff and designers. The goal in these workshops was to teach the information

was necessary to enhance their understanding of the process. I was confident that anyone could learn to understand our process and that it was simply a matter of carefully paced and thorough instruction. I planned to provide a direct hands-on experience, believing it would result in the most realistic understanding of the animation process.

I met with the designers, sales, and corporate communications staff as a group for one hour, once a week, for approximately 6 weeks. I also met with them individually for one hour for approximately 10 weeks. The sales and corporate communications staff and the design staff, met in different groups but the course structure was basically the same.

5.1.1. Orientation

The groups had never worked on a computer before. The first several weeks were spent introduces them to working with a computer. I worked with the individuals at the pace that they dictated, while making sure that each concept was clearly understood before moving on. The most difficult introductory concepts for them to understand

were the hierarchical arrangement of the directories, and the difference between an editing command within a file and a command at the shell level. In other words, the difference between a command to move a line within a file and a command to move and a file to a new directory was problematic. After hours of practice and assistance, most of these command concepts were understood.

5.1.2. Data Generation

Once the group started creating data, I begin to cover large numbers of programs that are utilized in production to create data. Each person created a series of data sets, experimenting with programs to generate symmetrical objects, projected objects, and tubular objects. Since most of the animators digitize commercial logos from high contrast black and white stats, I requested the workshop participants to do the same.

Although the programs that allow the animator to digitize the logos are quite easy to use, it takes a great deal of practice and patience to digitize a logo that will look good when enlarged to full screen. The workshop participants discovered that this was not as easy as they

thought it would be. Some would rush through the first run, and spend a great deal of time trying to fix it. Others would be very careful in the beginning and had very modifications to make at the end.

5.1.3. Surface Attributes

Learning the methods for assigning surface attributes followed the generation of the data. The surface choices of dull, shiny, opaque, and transparent was simple to explain but often difficult to achieve. It took a long time to understand how to control the size of the highlight, the degree of transparency, and the relationship of a reflection map to the object's surface. Since the time of these workshops, many of these programs have been combined. It is less time consuming learning just one program to control many of the surface attributes, than to learn all of the unique features of ten programs.

Although they had a great deal of fun experimenting and playing, few realized how difficult it is, as animators, to achieve colors which match PMS colors or the colors of the storyboard. The hours of fine tuning that

the animators do with the color and lighting can only be fully understood if you have experienced it.

5.1.4. Motion

There were two different motion systems available for the workshop participants. I asked them to design rough storyboards and to attempt to animate their logos to the constraints of the storyboards. Most of them did start their motion on one of the motion systems. However, most participants began to loose their interest or became pressured with the other responsibilities associated with their job and did not complete the motion setup.

Only one actually combined his color and lighting decisions with the motion for a low resolution color test. None of the participants finished the entire project.

5.1.5. Problems

The original goal of the workshop was to provide direct computer experience for the participants. The experience was intended to provide a realistic view of the production process. The 'hands on' activity did prove

successful and the participants understood the complexity of the process. However, it was not possible to place them in a real life situation with clients, deadlines, and the amount of pressure associated with creating a computer animated commercial.

Often the data generated and motions achieved were not of the level required for commercial work. It was not possible during the workshops to spend the amount of time required to achieve professional quality animation.

The most frustrating aspect of the experience was the lack of interest from some of the participants, and the lack of available time for those who were interested. The sales staff traveled frequently and had numerous phone calls during the workshops. In fact some did not attend more than one or two workshops. The lack of attendance has not affected their sales record. However, these individuals require additional time for each production for explanations of cost and time analysis.

5.2. Animation Workshops

When a computer animation company supports a staff of computer graphic software engineers a method of introducing the developing software to the animation staff should exist. The interaction of the animation and software staff in the development and usage of graphics software creates an artist oriented animation system.

The working environment often dictates the level of interaction between the programmers and animators. If they are all working in the same areas and have visual and verbal exposure to the other's work, each can make comments and suggestions. However, if the work areas are segregated, it is difficult for each to acquire adequate exposure to the problems and solutions of the other's work. Graphics programmers who work in isolation rarely create software that addresses the needs of the animator in production.

Even when the graphics programmer works closely with one or more animators in the softwares development, the remaining staff needs to learn how to use the programs and to make suggestions for enhancements. The author introduced animation workshops to the company as a means of presenting newly developed software to the production

staff. Although other staff members were encouraged to attend, the goal of the workshops focused on the user interface and functions of the programs.

5.2.1. Workshop Guidelines

The main prerequisite for a programmer's presentation of new software is that the program is free of 'bugs'. Bugs are programming mistakes that cause the program to fail even if the user inputs the correct commands. Another prerequisite for the program is that an explanatory users manual be documented and available at the workshop.

Each program requires a slightly different approach to its presentation. However, all programmers are encouraged to present an overview of the goals and purpose of the software. The programmers are to address the production process problem addressed by the new software. If the software is developed for a specific production the programmers are to discuss its use in that production.

Specific usage rules are presented along with the features and limitations of the programs. Specific

examples of how the program worked are to be included as either a demo on the equipment or written as a handout.

During the presentation all of the staff attending were invited to ask questions. The question and answer interaction often led to new feature ideas in the program. These questions also addressed the specific concerns of the production staff.

5.2.2. Problems

The production staff's work day may range from being extremely busy, with ten to fourteen hour days, to days when they have more time to attend workshops and to interact. This is largely dependent upon the current status of their project. If the project is at its peak of production, the animators do not have the time to attend a workshop to learn about new programs. If the animators are at a less demanding stage of the project, they can attend the workshop and later inform their co-workers who could not attend. The manual documentation helps the co-workers to learn and discuss the program after the workshops.

Some workshops will be attended by most of the staff and others sparsely populated. One attempt the author made to encourage attendance was to hold the same workshop twice in one week. The first is held on Mondays at 11:00 am and the second repeat of the workshop is held on Thursdays at 3:00. This scheduling allows everyone a second chance to attend if they could not attend the first session.

Some animators simply do not attend at all, regardless of their work schedule. These individuals will then spend time on a production trying to learn how to use the program for the first time. It is not a very efficient usage of their production time, some individuals seem pleased with this approach, however.

Certain staff members felt that programmers tended to go into too much detail at times and that they provided more examples than necessary. They would become restless and leave. It was a difficult task as educational coordinator to discuss the level of detail required for the workshop and number of examples with the programmers. A balanced has been achieved. The programmers now announce that the workshop is over, but if anyone would

like to stay for more details and discussions, that they would continue.

5.3. Friday Afternoon Videos

The production staff is often very absorbed in their own particular project and may only see bits and pieces of their co-workers projects. The viewing and discussion of the company's work as a group was proposed on Friday afternoons. The gathering came to be known as 'Friday afternoon videos'. The entire staff is invited to the afternoon event with refreshments provided.

5.3.1. The Videos

The group gathers each Friday afternoon to see the work that had been completed that week. The viewing often included the animation, after post production, as a complete commercial with music, and any live action associated with the spot. The gathering of the staff to view the tapes is not only fun and informative, but it gives the company a sense of unity as they watch the work that represents everyone's efforts.

Competitor's tapes are also viewed at this gathering. The viewing of competitor's work enables the entire staff to see new techniques and trends in the field of computer animation. New ideas often result from the viewing of other's work. New developments viewed on the competitor's tapes is a constant reminder of the fast pace of this technology and the difficulty of being innovative in this field.

5.3.2. The Presentations

Simply viewing the tapes and admiring the staff's success is not the only intent of the afternoon session. Individual animators are often responsible for presenting any unique details of their process for one of the recently completed animations.

The animation is viewed again, and the animators discuss the production. The focus is on the unique problems and solutions encountered. If new software has been developed for the project it is announced. The animators also write a short description of the process and it is saved in a central notebook. If a similar project comes into production animators can recall the

presentation and refer to the notebook for more details.

5.3.3. Problems

The combination of the refreshments and viewing the week's works along with competitor's tapes is successful. However, the combination of all of these and the animator's presentation has not been a successful. The entire group, which often includes non-production staff, does not want to know the intricate details of the production. The fact that they are held on Friday afternoon and refreshments were available creates a party setting. Although this atmosphere works very well for the goal of viewing the videos, it does not work well for presenting the details of the animation. The animators often feel rushed to complete their presentation, so that everyone can see the remaining videos.

Both the functions of presenting the animation and the viewing of the tapes are important for the company. Therefore, the two will be separated, with the animator presentation being held earlier in the week, and the videos remaining on Friday afternoon. The animator's presentations may also be expanded to include a critique

of the animation from the production staff.

5.4. Leased Software Instruction

It is becoming more common for a computer animation company developing software to lease it to another company. The company has many things to consider when deciding to lease their software. Concerns are: software maintenance, and instruction for its use. Another concern for the company leasing the software is the reality of competition. Leasing software to a competitor, may create a loss of job contracts to that competitor.

When our company made the decision to lease software to another company, it was decided that a company in Japan, outside our usual market area would not create competition. The following describes some of the preparation of the software, documentation, and the instructional approach use to teach that company. The problem was compounded with the addition of a language barrier.

5.4.1. Documentation

Although a great deal of attention is given to manual documentation of software by the company, it is always assumed that assistance would be nearby if needed. This lack of proximity for direct assistance and a different language required that the manuals for software be rewritten.

Many of the manuals had examples of previous animations that had used the programs. Some even mentioned specific people to ask for further information. This could not be included for the Japanese because they could not call each time they did not understand something. Some of the examples of animation in the manuals were not on the sales demo reel. All of these examples had to be re-worded or deleted. If deleted they were replaced with written examples of its use within a animation.

Another factor which created difficulty was the specific programs that were to be licensed. Only the display software for rendering images were leased. Therefore, any references to the company's other software within the manuals had to be removed. These references,

although helpful for animators with that software, would only confuse and frustrate the animators in Japan.

All language that was not specific to computer literature was replaced with easy to understand words. It was important to remember that the manuals would later be interpreted into Japanese with an English/Japanese dictionary. Some words in the English language cannot be easily translated.

The programs themselves had to be altered slightly. They were enhanced to prompt the user with clear usage messages if they typed in the wrong command. A flag was also added to the program that printed a condensed quick reference of the manual to the screen.

5.4.2. Instructional Preparation

Once a complete list of the leased software to be and the manuals had been updated, I began to develop visual aids and data examples to take to Japan. I needed these to teach their staff how to use the software. I was not familiar with their approach to data generation before leaving and decided to create some of my own data for

examples to take with me. I created several simple objects, including cubes and spheres. I then rendered examples of all the features in the software with these objects, and recorded them to video tape with titles. The examples with titles would be used as part of the class instruction and would be left behind as a reference.

The Japanese planned the classroom format. I prepared an outline for the class. I was to stay in Japan for two weeks instructing the class. I planned the outline according to the software for lease. The logical order for using the software was the basis of the outline. I still needed to find out more about their production process in order to make comparisons. Unfortunately, I did not get this information until I arrived.

5.4.3. Classroom Instruction and Tutorials

Once I was provided with a tour and a brief explanation of their production process, I began classes. The company had arranged for approximately ten employees to attend the classes. Although the company was leasing software, it did support its own software staff. The class consisted of part of the software and animation staff. The

animators did not have a technical background and often the software staff would continue to explain the concepts and answer questions in Japanese for the animators. I provided handouts each day of my lecture for them to translate later. The handouts included step by step examples of how to scale, rotate, translate, color, light, and display an object. The commands would remain in English within the program. Therefore, these portions of the handouts could be used right away with translation.

They videotaped the classroom sessions which lasted two hours each morning. In the afternoon, tutorials were given to the class members. I would demonstrate the topics discussed in class that morning, and then the participants would team up and try out each procedure. They would first try to duplicate the examples and then attempt something new.

They were very quick to learn the programs and we completed the classroom instruction in one week instead of the predicted two weeks. I was then asked to advise them on a production that was to begin. I suggested ways to use the software for their specific production, and continued to assist animators who were not on that production.

5.4.4. Problems

The language barrier was the greatest problem of the entire experience. It was difficult in both the classroom and the tutorials because I had to wait after every few sentences for the interpreter to repeat what was said to the class in Japanese. There is always the concern that the information may be translated incorrectly. Often I would talk longer than a few sentences, up to a paragraph, and the interpreter would only say a few words. When the question and answer sessions continued in Japanese, I was always concerned and curious about the answers. There were times when I returned after the classroom portion was over and the interpreter was not there. It became humorous trying to answer questions with a Japanese/English dictionary. After struggling with the language, I began pointing to the screen and drawing examples.

5.4.5. Summary

Through this experience I concluded that when preparing documentation materials for leased software it is important to use clear and concise language. Use

terminology that is known throughout the profession and avoid customized terms that develop within a company. Provide numerous examples and complete explanations of each. Step by step 'cookbook' style instructions are easy to follow and implement.

When instructing individuals to use the leased software review the manual documentation. Demonstrate the examples within the documentation. Encourage individuals learning the software to try the provided examples. Assist the individuals in attempting other approaches to using the software. Try to find out the process that the individuals are currently working with and make comparisons.

It is very important that the training leasees have a balanced proportion of classroom instruction and 'hands-on' experience. They should have time to test their knowledge of the system and ask questions when necessary.

CHAPTER 6

A Proposed Structure For Orientation And Training

A structure for orientation and training for selected employees within a computer animation production company is proposed. The employees are divided into two categories: animation/software staff and corporate support staff. The support staff includes: storyboard designers, sales representatives, and the corporate communications staff. The production staff includes: the animators and computer graphics programmers. The specifics of the programmer's orientation to programming standards, system libraries, and hardware considerations are not discussed in this structure.

The client also needs an overview of the production process. This is addressed separately from the two categories mentioned above. This overview will vary according to the previous experiences of the clients with computer animation production companies.

6.1. The Clients

6.1.1. Preliminary Overview

The client needs a preliminary overview of the production process of computer animation. A process videotape is suggested as a means of providing the client with this overview through the mail. The process videotape functions as an introductory overview to the terminology, features, and limitations of computer animation. Some clients are advertising agencies representing another client. The process videotape provides the advertising agency the necessary information to discuss the process with their client. It is recommended that the agency take a copy of the tape to their client to review together.

6.1.2. Tour And Demonstration

A tour of the computer animation production company, and demonstration of the programs to create graphics, helps the client to relate the information on the process videotape to their project. The tour and demonstration is more effective if the objects that appear in the clients animation are provided as examples. The tour guide must be careful to describe concepts, either in terminology that

is consistent with the process videotape, or in layman's terms. Although presenting simplified objects and concepts helps the client to understand the process, the tour guide should be careful not to mislead the client into thinking everything is easily achieved.

6.1.3. Process Reviews

Throughout the process the client should be informed about the status of the project. A review of the process videotape, and tour concerning the specific stage helps the client to understand the work that has already taken place and the amount of work still remaining. When the client receives tests throughout the project, they should be reminded in a letter what the test represents and what the limitations are to suggested modifications. Clients require explanations as to why some changes are not possible within the time and budget restraints of their project. It is also necessary to explain to the clients why each process takes so much time during the production. There will be some clients that will always have a problem understanding what they are seeing in the tests that they receive. There are some individuals that have a very difficult time making the correlation between test data,

low resolution motion testing, and the final product. With these individuals it is recommended that a tape, which includes collections of previous projects tests and their final animations, is prepared and reviewed several times with the client. It is important to show extremely rough tests as well as final tests to these clients in comparison to their final animations.

6.1.4. Post Production

Post production meetings with clients shortly after completion of the project enables the production staff involved and the clients to review the positive and negative aspects of the production. The clients can enlighten the production staff about what they found difficult to understand. They can also explain what they found to be frustrating about working with computer animation. The production staff will try to incorporate this feedback into their next production.

6.2. Corporate Support Staff

The corporate support staff includes the designers creating storyboards, the sales representatives, and the corporate communications staff. Although each of these positions require their own specialized background of training and education, each must know the process of computer animation to do their work effectively. The assumption is made that each of these participants have previous experience relating their job descriptions, and will only require training on the process of computer animation.

6.2.1. Preliminary Overview

6.2.1.1. Historical Perspective

The first step in understanding the field of computer animation is to know its history. The historical overview provides exposure to the varied applications of computer graphics and enhances the appreciation of computer graphics. Understanding how far the technology has advanced in so few years helps the support staff put their company's work into perspective.

University courses may be available at local colleges that provide a historical overview. The company should

sponsor these employees to attend courses that will help them understand the field of computer animation.

If courses are not available the company should provide the employees with an historical appreciation course. Reading materials, videotapes, and films are available through libraries, unversities, and seminars that could be incorporated into an in-house course.

6.2.1.2. Brief Overview

A brief overview of the production process should cover each of the major steps in creating computer animation. A process videotape can provide a such brief overview of the entire process from the initial client contact to the final recording of the animation. A tour of the equipment as it relates to the production should be included in the overview. This first overview exposes the employees to the effect each stage has in the production process. It will help them to later understand each stage as it relates to others when they learn them in more detail.

6.2.2. Intensive Overview

After the new employees have a general impression of the production process from start to finish, an intensive training program begins to expose them to some of the details of each stage in production.

6.2.2.1. Computer Concepts

If the employees have never taken an introductory course in computer concepts, then the details of the production process will be more difficult to understand. An understanding of concepts relating to operating systems, file editing, and file manipulation is an important foundation for understanding computer animation concepts.

The computer concepts orientation will require a great deal of patience and understanding from the educational coordinator. Simple concepts of logging on the system and changing directories often do not seem important to the training employee. However, once they learn some of the graphics programs, and want to practice on their own, it becomes apparent that they must know the basics. It is likely that the training employees will

want to rush into the graphics, without knowing the basic concepts of working on a computer system. Experience proves that time spent learning these concepts is extremely valuable on their own. Learning to log on, log out, start processes; and kill processes should be understood before the trainees begin to create images with the computer.

6.2.2.2. Data Generation

Learning the methods available for the animators to create data can be overwhelming in some companies. When programmers are not encouraged to follow software programming standards for user input consistency, each program's usage might be unique. The training employees do not need to know every available program. They do need to know that there are several approaches often taken to create objects in animation. A knowledge of different techniques available to create animation provides the training employee with an understanding of the problem solving process that is involved with each object created on the computer. They will understand that the animator considers how complex the data will need to be, whether it is to be constructed in parts or as one complete object,

and how the animation often dictates these approaches.

This exposure to the data generation programs also enhances the corporate support staff's knowledge of data terminology. They should learn the concepts and procedures of lofting, tubular objects, projected objects, beveled objects, and solids of revolution. Understanding the terminology will help each of these support staff members to more effectively communicate with the production staff.

6.2.2.3. Motion Definition

Animating the objects created during the data generation portion of the training is the next step in the intensive overview. The trainees can begin to understand how the complexity of the objects affects the look of the animation. For example, objects that have rough edges should not be viewed large on the screen.

The trainees are asked to create a storyboard for a short animation. The storyboard should depict in motion the objects previously created. This experience correlates the abstract keyframes of a storyboard to the timing of the animation. The reality of just how short a few seconds really is, becomes apparent when the trainees

try to implement their storyboard ideas.

If the company has interactive motion software the trainee should learn the basics in order to input their storyboard ideas. If the animators write their own computer programs to create animation it is more difficult for the trainee to set up their own animation. In the later case, the educational coordinator can input the animation ideas of the trainee. In both cases the trainee can see the effect of the objects and storyboard constraints place on the animation.

The concepts of ease functions, off axis rotations, and object space verses world spaces should be explored.

6.2.2.4. Surface Attributes

Once the data has been created and motion defined, the trainees will need to learn the available surface attributes of the company's rendering software.

6.2.2.4.1. Color

When learning the concept of assigning color, the trainee must first understand that the computer

animator's primary colors of red, green, and blue. The trainees need to learn the differences between mixing colors with light numerically and mixing colors with paint. Programs specific to creating color assignments should be discussed after the trainee understands the numerical representation of color within the computer software.

6.2.2.4.2. Highlights

Control of the size, shape, intensity, and color of highlights, effects the look of the object. The trainees should learn how the animators control these parameters, and how they fake them when they are not possible. Understanding how the highlight is effected by motion should be incorporated into their motion tests. Learning the appearance of a highlight on a curved or flat surface in the real world will help the trainees understand the highlights on objects within the computer.

6.2.2.4.3. Transmittance

The amount of light which passes through an object can be controlled with the transmittance parameters.

Learning to simulate clear plastic or translucent glass within the computer system teaches the trainees both the personnel and computation time required to achieve an affect.

6.2.2.5. Calculation

Preparation and execution of calculated frames for both low-resolution, color motion tests, and final frame calculation should be required of the trainees. Learning the organizational skills of animators, at this stage of production, is one of the goals for this experience. A knowledge of the extensive amount of personnel and computation time required to prepare and execute final frame calculation is recommended. Understanding how final calculation relates the preliminary stages of data generation, color and lighting, and motion definition is another goal of the experience. They will understand the reason the animations are fully tested in line form and low-resolution before calculating final frames.

6.2.2.6. Recording

Recording the calculated frames to film or video will complete the intensive overview. The trainee will learn to composite individual layers of calculated frames to create one single frame. The experience of recording an animation will expose the trainee to the capabilities of the recording system. For example, cross-fades, image translation, image intensity, and additional color control, may be manipulated as the individual layers are composited. The recording process also reveals the expense of human errors. If the animators make mistakes some portion of the animation will need to be done again. This risks a failure to deliver on time.

6.2.3. Demo Reels

The trainees should spend several weeks studying the company's sales videotape and competitor's demo reels. They should know which company produced a particular animation, and describe the animation in detail. The trainees should also be familiar with the style of each company. For example, if one company is known for its simulation of glass, or another for articulated motion of

characters, then the trainee should be prepared to discuss it. Knowing the work of their own company is extremely important. They should view current and past videotapes. They should also have exposure to animations that did not appear on the demo tapes.

This extensive knowledge of their company's and competitor's work is recommended for those employees who represent the company as client contacts, sales representatives, conference speakers, or corporate communications writers.

6.2.4. Mock Client Contacts

Mock client visits and phone contacts are recommended for the sales representatives and designers. The designers need this experience if they will accompany sales representatives to present storyboards. The training sales representative, and designers will rehearse sales calls with more experienced sales representatives playing the role of the client. The more experienced sales representative will know the types of questions and responses typical to clients. Videotaping the rehearsal visit enables the trainee to review their presentation

with the more experienced designers and sales representatives.

6.2.5. Trainee Presentations

The trainees will do a presentation before a group of representatives from the design staff, sales representatives, and technical/production staff. These presentations will also be videotaped, and reviewed. The representative staff members will quiz the trainees to insure they are prepared for actual client contact.

6.2.5.1. Sales Representatives

The training sales representative will rehearse a sales presentation for an advertising agency. The trainee will be expected to show the sales videotape, the process demo reel and talk about the company's experience in computer animation.

6.2.5.2. Designers

The training designers will rehearse a storyboard presentation for a client and/or advertising agency. Two or three ideas should be presented for one proposed

commercial spot. The designer will discuss each of the boards and the use of the clients concept or message in each. Written explanations of timing and motion will accompany the storyboards for the clients.

6.2.5.3. Corporate Communications

The training corporate communications representative will rehearse a presentation for a community group. The trainee will show slides, the sales videotape, and the process demo reel. The trainee will discuss the company's background, current projects, and future goals. They should be prepared to answer a wide variety of questions. For example, typical questions are: "What are the prerequisites of becoming a computer animator?" and "Isn't that really done with models and cameras?".

6.2.6. Trainee Apprenticeship

Each trainee will accompany their more experienced co-workers to client visits or presentations. They will view the more experienced employee interact with clients and/or the public. After an appropriate amount of time the trainee will lead the presentation or contact for the more

experience employee to view.

6.2.7. Information Updates

Once the trainees have completed their orientation and are functioning in their respective positions, they should attend regular information update sessions. In these sessions they will learn any new techniques available for animation. The cost for the new techniques in a production will be presented.

6.3. Animation/Software Staff

The animators and programmers should go through the same initial orientation. The programmers will need additional orientation and training that is specific to the responsibilities of a graphics programmer within the company.

6.3.1. Preliminary Overview

The preliminary overview for the animation/software staff encompasses the brief overview portion of the preliminary overview, and the videotape for the corporate

support staff outlined above.

6.3.2. Programming Language

If animator is not familiar with the programming language mainly used by the company then they will need to learn it. The programmers may need a more extensive knowledge of the language than the animators. To learn the language they should attend a local university programming language course. If courses are not available company programmers should teach the language to the training employees.

6.3.3. Operating System

Unix is the most commonly used operating system and most trainees will have experience using it. There are numerous books and manual documentations available covering the Unix operating system. If the company uses a different operating system then they will need to teach it to the new trainee.

6.3.4. Intensive Overview

The intensive overview for the production staff differs in time and level of detail from the non-production staff. The production trainees will need to know the usage of all available programs, and equipment.

6.3.4.1. Data Generation

The production staff must learn all available methods for creating data. Programs to create lofted data, solids of revolution, projected, and tubular data should be fully understood. The benefits of using one program over another, for a particular project should be explained.

6.3.4.2. Data Manipulation

The programs available to manipulate and distort data should be demonstrated and experienced. Programs to change shape, scale, bend, grow a section at at time, and manipulate point and polygon information should be fully understood.

6.3.4.3. Motion Definition

Software programs and equipment available to set up and define animation should be experienced and compared. Ease functions, spline manipulations, change shapes, paths, and keyframe or event driven control, within the motion software should be fully understood.

6.3.4.4. Surface Attributes

Programs to create all available surface attribute parameters for rendering software should be learned. The generation of reflection maps, texture maps, vertex colors, polygon colors, and surface normal files should be fully understood.

6.3.4.5. Calculation

All necessary information to calculate frames on available equipment should be covered. The separation of layers to later composite, clustering information, limitations on amount of information processing, and any unique qualities of different computers must be known before the animators begin to calculate.

6.3.4.6. Recording

All information concerning video and film recording and playback should be explained and demonstrated. The trainees should know the approach to recording motion tests and final frames. Information concerning RGB to NTSC, keying animation over live action, forward and reverse playback, looping, and frame manipulation should be fully understood.

6.3.4.7. Images For Print

All information necessary to crate 4x5 transparencies or slides should be explained. The trainees should know if the file format needs to be changed, or if the frame should be calculated at a higher resolution.

6.3.5. Apprenticeship

Once the animators have completed their orientation they should be assigned to work with another more experienced animator as an apprentice. The more experienced animators will act as the technical director or supervising animator. The apprenticeship relationship should last for one or two projects.

6.3.6. Information Updates

Production workshops presenting changes in the animation system should be held as they changes develop. New programs should be presented and manuals documented. All program manuals should be kept up to date, and available in notebooks and on the computer system.

6.3.7. Summary

The assumption as been made within this proposed structure that the new employee has some previous computer animation experience. If the company's policy for hiring animators without previous experience chooses to implement such a structure, then they will need to add a considerable amount of time to each level of the intensive overview. The company that hires animators without computer animation experience incurs the cost of that computer education.

CHAPTER 7

Summary

There are many unique characteristics of the employee responsibilities associated with computer animation that have been addressed. Much of the proposed training structure may apply to other computer related working environments. Areas specific to 3-Dimensional computer animation include: 3-Dimensional data generation or motion control, calculating frame sequences, and recording to video or film. These specific areas would be substituted for another company's computer related process for creating its product. The general orientation to the company's process, and the intensive overview of the employees roles within the company are valid regardless of the company's product. The overall training and orientation of the corporate support staff applies to most computer related production companies.

Employee incentives to continue attending training workshops are suggested. Most employees need more than personal incentive to learn new information before it is needed in their job responsibilities. It is recommended

that the company's management take the responsibility for rewarding employees who attend workshops and contribute to the overall knowledge base of the employees. The management should recognize that employees who are knowledgeable about their working environment are more efficient workers.

The educational coordinator's responsibilities may not require a full time position. Therefore, it is recommended that this employee have other job related responsibilities. If the educational coordinator work for a computer animation company, then it is recommended that they also be animators. The level of involvement of the educational coordinator in the production process relates to their knowledge of the system. An educational coordinator that also creates animation will have a better understanding of the process and will be better prepared to teach the new employees.

List of References

1. Leeman, Ruedy W.. "Design And Curriculum Considerations For A Computer Graphics Program In The Arts". Unpublished Masters Thesis. Computer Graphics Research Group, The Ohio State University, Fall, 1985.

2. Newman, William A. and Sproull, Robert F.. Principles of Interactive Computer Graphics. McGraw-Hill Book Co., New York, 1979.

3. Sachter, Judy. "The Basic Concepts of Three-Dimensional Computer Graphics for Artists". Unpublished Masters Thesis. Computer Graphics Research Group, The Ohio State University, June, 1984.

4. Thomas, Frank and Johnston, Ollie. Disney Animation: The Illusion of Life. Abbeville Press, New York, 1981.