

**MIDLANDS STATE UNIVERSITY**

**Faculty of Arts**

**Department of Film and Theatre Arts**

**Dissertation Topic**

**An investigation into the growth and use of computer graphics and animation in Zimbabwe: Present and Future Prospects.**

By

Quinton Mutsinze

Registration Number R126385N

SUPERVISOR: Dr Rwafa

A DESSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE BACHELOR OF ARTS HONOURS DEGREE IN FILM AND THEATRE ARTS STUDIES.

## **DECLARATION**

I, Quinton Mutsinze, sincerely declare that this dissertation is my original work that has not been previously submitted to any other University. Proper citations and acknowledgements have been used in line with the copyright law and ethical requirements have been strictly adhered to in writing the text.

Signed By (Student) – **Mr Q. Mutsinze**

.....Date.....

Signed By (Supervisor) – **Dr Rwafa**

.....Date.....

## **DEDICATION**

This dissertation is dedicated to my loving Father, Mother and sisters. My Family, and Micheal Mupotaringa who been a pillar of strength when life was difficulty.

## **ACKNOWLEDGEMENTS**

My sincere gratitude goes to Dr Uther Rwafa, whose guidance and criticisms enabled me to stay focused and successfully complete this Dissertation

I also love to thank my entire family and friends for believing in me and standing by me through the tough times.

A big thank you goes to the interviewee Mr Nqobizitha Mlilo who gave his time and attention. This report would never be complete without your cooperation. Thank you.

## **ABSTRACT**

Computer graphics and animation has emerged as a strong competitor in the film making arena with the advent technical world Zimbabwe has also had a taste of the fast digitalised satellite television that is DSTV. Film making and television programming in Zimbabwe has also experienced an evolution with the introduction of satellite television in that most people are now accustomed to trendy genres to view. This study is mainly focusing on finding out whether or not computer graphics and animation are being used in film and television production to their full potential. The study is also aimed at tracing the development of Computer graphics and animation and predicts its future in the production of films in Zimbabwe. Currently the Zimbabwean film industry has little education facilities that teach computer graphics and animation, also television and film has grown to be less competitive and unappealing to the Zimbabwean audience and cannot compete with other Film and television Industries because of the advent of the use of computer graphics and animation in production.

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## **Acronyms**

CGI	Computer generated imagery
CG	Computer graphics
RT	Render time
DSTV	Digital satellite television
Anime	Animation
VFX	Visual special effects
3D	Three dimensional
2D	Two Dimensional
LOD	Level of detail
ZBC	Zimbabwe broadcasting corporation
VOD	Video on demand



## **Chapter 1**

### **Introduction**

This research aims to analyse the extent to which Computer graphics and animation has been used to revolutionise the technical aspects of filmmaking in Zimbabwe. Computer graphics and animation are tools that have been favoured by African film makers and have not gained popularity within the film industry of Zimbabwe over the past years. The research will also explore how much of computer graphics and animation as tools have been used in the making of films in Zimbabwe, and how knowledgeable are Zimbabweans in applying animation technical related skills such as visual effects, 3D Modelling, rigging and rendering. The study also seeks to illustrate how computer graphics and animation have been used and how best it can be used in the making of more films in Zimbabwe the findings of this research will be obtained through primary data such as questionnaires and interviews along with secondary data.

### **Background of study**

According to definitions found in Charles Solomon's History of Animation: Enchanted Drawings, first published in 1989 and reprinted by Wings Books in 1994 Computer graphics are visuals created using computers and the representation of image data by a computer specifically with help from specialized graphic hardware and software. Computer animation is the art of creating moving images via the use of computers. Animation is a subfield of computer graphics. Animation is a graphic form created by means of 3D computer graphics, though 2D computer graphics are still widely used for stylistic, low bandwidth, and faster real-time rendering needs. Sometimes the target of the animation is the computer itself, but sometimes the target is another medium, such as film in this case. It is also referred to as CGI (Computer-generated imagery or computer-generated imaging), especially when used in films.

Animation is the change of an attribute that is known as a key frame over time. Multiple methods of achieving animation exist the rudimentary form is based on the creation and editing of key frames, each storing a value at a given time, per attribute to be animated. The 2D/3D graphics software will change with each key frame, creating an editable curve of a value mapped over time, in which results in animation. Other methods of animation

include procedural and expression based techniques the former consolidates related elements of animated entities into sets of attributes, useful for creating particle effects and crowd simulations; the latter allows an evaluated result returned from a user-defined logical expression, coupled with mathematics, to automate animation in a predictable way convenient for controlling bone behaviour beyond what a hierarchy offers in skeletal system set up (Charles Solomon,1994).

To create the illusion of movement, an image is displayed on the computer screen then quickly replaced by a new image that is similar to the previous image, but shifted slightly. This technique is identical to the illusion of movement in television and motion pictures.

Computer graphics and Animation can be a very powerful way of attracting a viewer's attention; it communicates complex ideas and presents information on the World Wide Web. There are different aims and purposes for creating animated content. In Zimbabwe the purposes for animated content can be to educate, inform, sell, entertain, or to provide cosmetic elements for a film as well as create full feature films. Computer graphics and animation in Zimbabwe have been used since independence in 1980, and before during the colonial era. Any animation at that time was done and aimed at the white minority. Therefore the black community was confined to the reserves and whenever they needed basic necessities they had to buy their goods through a window at the back of the shop. This was a way to segregate the blacks from the whites. So design played no part in what they bought because they had no choice. Design (is a basis for animation) was very simple because the audience was not demanding and there was no competition. Still under economic sanctions there were many shortages and with the war reaching its climax, in the 1960s and 1970s computer graphics and animation literally came to a halt. (Solomon maramba, 2011) It is important to understand the history of Zimbabwe so that one can compare it with what was happening in Europe during its development.

A research made by Solomon Maramba on the “history of animation” in Zimbabwe of (Joint African Animation Group, 2011). The most common form of animation and computer graphics were made in 2D mainly for television programme and commercial adverts, and was limited more too political propaganda. Most of computer graphics and animation of the 80's

was development work because the government policy direction was towards health and education. During the 80's censorship was still rife. Computer graphics and animation were not common tools among the Zimbabwean black film makers, as they lacked knowledge, due to the lack of educational facilities that taught computer graphics and animation and is still the case. Besides Harare polytechnic and the Zimbabwe Institute of Vigital Arts, which taught basic graphic design and recently the Midlands State University and Chinyoyi University ([www.msu.ac.zw](http://www.msu.ac.zw), [www.cut.ac.zw](http://www.cut.ac.zw))

Few black film makers used computer graphics and animation to enhance and make the music videos and films. During the late nineties Music video such as those by Tendai Muparutsa and "Comrade Chinx" were mostly computer generated videos. In addition films such as "Flame and Neria" have certain aspects that where computer graphic imagery generated and were used to manipulate scenes such as explosions and gun shots and several other animated illusions.

According to Solomon Maramba (JAAG, 2011) In 1992 Zimbabweans began equipping and updating software's used to generate animated visuals. In the early 1990s, the availability of bit-slice and 16-bit microprocessors started to revolutionise high resolution computer graphics terminals which now increasingly became intelligent, semi-standalone and standalone workstations. Graphics and application processing were increasingly migrated to the intelligence in the broadcast station, rather than continuing to rely on central mainframe and mini-computers. Typical of the early move to high resolution computer graphics intelligent workstations for the computer-aided engineering market were the Orca 1000, 2000 and 3000 workstations, developed by Orcatech of Ottawa, and led by an early workstation pioneer David John Pearson (Apple Inc). The Orca 3000 was based on Motorola 68000 and AMD bit-slice processors and had UNIX as its operating system. It was targeted squarely at the sophisticated end of the design engineering sector. According to Chaz Maviyane-Davies([www.ziva.co.zw](http://www.ziva.co.zw)(visual arts), one the first graphic artists in *Rhodesia* Zimbabwean Artists and graphic designers such as Chaz Maviyane-Davies a Zimbabwean Computer graphics designer, began to adapt the personal computer, particularly the Commodore Amiga and Macintosh, as a critical design tool, one that could save time and draw more accurately than other methods. *Rhodesia* companies such as Danes Design which started in 1991 established standards in the design industry and started to win several awards for their work. In the late 1990s, SGI computers were used to create some of the first fully computer-generated commercial adverts (Zimbabwe school of Vigital arts).

## **Statement of the problem**

Computer graphics and animation has emerged as a new production process used in the film making arena with the advent technical world Zimbabwe has also had a taste of the effects of this form of production process upon its film industry. Filmmaking and television programming in Zimbabwe has also experienced an evolution with the introduction of satellite television in that most people are now accustomed to trendy computer generated imagery. This study is mainly focusing on the lack of the use computer graphics and animation in the production process of film making and television programming. The research essentially aims to explore the extent to which computer graphics and animation is being used to produce films and television programs in Zimbabwe. The use of CG and animation by Zimbabwe's competitors has affected the film industry in Zimbabwe in several ways that have made the industry none lucrative for investment from businesses in Zimbabwe, it has also influenced viewers to prefer VOD and DSTV platforms, also affecting the education system through what children are exposed to on VOD and DSTV platforms, which consist of almost 100% of animated content. The study is also aimed at tracing the development of computer graphics and animation and predicts its future in the production of films in Zimbabwe.

## **Research Aim**

To find the extent to which computer graphics and animation are being used in Zimbabwe to produce film and television productions.

## **Research objectives**

1. To outline the elements of Computer graphics and animation
2. To identify key elements of computer graphics and animation and their implementation in Zimbabwean film and television production
3. To examine the existence and production elements of Computer graphics and animation in Zimbabwean film and television productions
4. To demonstrate the pipeline production of animated films between 1980-2016 in Zimbabwe
5. To suggest measures and ways to promote the use of computer graphics and animation in Zimbabwe.

## **Research Questions**

1. What is computer graphics and animation?
2. How can computer graphics and animation improve film production in Zimbabwe?
3. What are the challenges faced by animators in Zimbabwe?
4. What is the future of computer graphics and animation in Zimbabwe?

## **1.4 JUSTIFICATION OF THE STUDY**

### **1.5 RESEARCH METHODS**

#### **Research Methodology**

This research shall be based on a qualitative approach, and quantitative approach will be applied when necessary especially in the selection criteria. Quantitative approach is defined by (Saunders, 2004) as based on meanings expressed through words. The potency of the qualitative approach lies in its invariably unstructured nature that heightens the susceptibility of getting at actors, meanings and of concepts emerging out of data collection as opposed to quantitative approach, which is typically highly unstructured and therefore produces limited data (Bryman, 2001).

#### **Questionnaires**

The questionnaire approach is going to be useful because it permits wide coverage of the audience. These will be administered to Midlands State University students studying film and Computer graphic artists and animators in Zimbabwe. Written questionnaires shall be used to collect data from respondents According to (Foddy,1994) a questionnaire is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents. Unlike other research methods, the respondent is not interrupted by the research instrument in that it is standard and has easy guidelines and this will also ensure that respondents, normal routines are not entirely interrupted. The questionnaire will be given to all participants of the research.

#### **Semi-structured Interviews**

According to Dooley (2003), semi-structured interview is flexible, permitting new questions to be taken up during the interview as a result of what the interviewee says. This system is to be used to obtain response and offers the interviewer the opportunity to explore an issue. It permits the interviewee to express their opinions, concerns and feelings. The fact that it is semi-structured allows the conversation to flow where it needs to in order to deal with issues as opposed to cutting someone off because they stray from the topic.

## 1.6 Theoretical Framework

This study will make use of Realism theories especially the one propounded by Rowley (2005). Known as Visual Realism. The researcher chose these two theories Dimensionality and the level of detail (LOD) because the nature of the study which focuses on the visual nature of computer graphics and animation, a new production process, that replaces the need for cameras to make a film.

There is no pre-existing reality, no polemic event captured in its occurrence, an Animated film exists only when it is projected. With no any existence in the world of Actuality, the animated film like the partially dramatized documentary, rely on a kind of Artistic re-enactment, depending, in part, on imaginative rendering as compensation For the camera's non-presence at the event" (DelGaudio, 1997)

Several types of realism can be identified (Rowley, 2005) in the following paragraphs extended. The study will not only explain technical concepts, but also look at the role of computer graphics and how it enhances realism, and which type of realism is applicable for the study. Visual Realism (Rowley, 2005) evaluates the extent to which the animated environment and Characters are understood by the audience compared to the ones from the actual physical world.

Dimensionality and the level of detail (LOD) are two main aspects of visual realism. Dimensionality refers to the extent that an illusion of depth is created, whereas LOD describes the extent to which the background depicts complex particularities of the environment. 3D modelling software, e.g. Maxon Cinema 4D, Maya (Autodesk, 2010), can not only provide the advance modelling tools for shaping the objects, but also supply the advanced rendering techniques for artist to build the very realistic environment with vivid texture and lighting. Moreover, even an individual without any drawing skills, can use most of the current 3D modelling software (Autodesk, 2010) to model the objects, characters, and landscapes (Rowley, 2005). The visual realism type is the most applicable from the CG point of view in this study as this depicting complex particularities of the film and television production.

Aural Realism (Rowley, 2005) is similar to the visual realism mentioned above but at the sound level. It is an important aspect of the realism to enhance films created using computer graphics, and to convince the perception by the audience (e.g. as in *Little Voices* of real children recorded). Although one may allude that these days a lot of it is also computer-generated, but it is outside of the scope of this study.

Realism of Motion (Rowley, 2005) contrasts with characters moves and motion. Traditional animation relies on persistence of vision and refers to a series of illusions resulting from the display of static images in rapid-shown succession. The researcher will assert the extent to which post colonial film makers have to use not only their drawing skills and intuition, but also pose some knowledge of physics to make the objects behave as if they are in the real world or close. The researcher assumes that the motion of the virtual objects does not convince audiences if no natural laws of physics are applied in production. Moreover, without alluding drawing the virtual objects move from one frame to another frame is an insufficient way without functionality provided by software. However, the researcher believes that one of the computer techniques, which is motion capture is very efficient and accurate to describe virtual objects motion. It attaches sensors on actors bodies and records the data for their movements and apply these data to a computer generated characters. This technique increases the realism of motion dramatically (Rowley, 2005). Which the researcher assumes that additionally, some physics principles combined with computer graphics rendering techniques, e.g. soft body simulation (Song, 2007; Song and Gorgon, 2008; Song and Grogono, 2009), contribute a lot in this realism type by tweaking physical simulation parameters of the laws, such as gravity, material properties, inertia, one can produce interesting visual motion, such as feature film such as *District 9*(2010) South Africa.

Narrative and Character Realism (Rowley, 2005) attempts to make audience believe the fictitious events and characters of the animated film actually exist. For example, in order to portray the animated character vividly, artists use the squash-and-stretch method exaggerated for soft parts of the character in traditional animation techniques (Rowley, 2005).. Today's computer graphics software often provide a group of functionality and library, such as hair, skin, clothes animation, skeleton animation in order to simplify artists' work and achieve more realistic results (Rowley, 2005). In Zimbabwe several post colonial films have elements of CGI, such as *Neria*(1992) where car explosions are present, reflecting the use of narrative



realism the researcher will also investigate the use of this theory to assert the existence of use of CG.

Social Realism (Rowley, 2005) makes audience believe that the event take place in the Fictitious animated world is as complex and diverse as the real world. This concept applies both on traditional animation and computer animation. In order to achieve social realism, artists not only rely on other visual, character, motion realism, but also count on the writing of the television production (Rowley, 2005). The researcher will formulate a research that will investigate if filmmakers apply the theory of Social realism in they animated content.

Psychological Realism was first time brought up by Chris Landreth, the director of animated short documentary. It does not consider the physical based motion as the priority, nor use some techniques, such as rotoscoping and motion capture. Instead, it uses an original, personal, hand animated three-dimensional world which Landreth calls psychological realism. Using a technique called psychological realism, the movies and television programs should shows the emotion of the characters. The researcher assumes that the above theories are crucial as the characters in film are always the main point of audience attraction as to that of any physical film produced.

## **1.7 Chapter Organisation**

The research project is divided into four chapters. Chapter one is the introduction to the research. It presents the introduction, background of the study, the aims of the study, sub-objectives of the research, research questions, justification of study, research methods, conceptual framework; scope of study, definition of terms and conclusion. Chapter two is the literature review. It presents the introduction in Defining CG and animation, The role of CG and animation in film and television. The challenges faced by existing animators in Zimbabwe. The significance of CG and animation in film and television in Zimbabwe. The importance of having CG and animation education. The existing CG and animation institutions in Zimbabwe. Production pipeline that exist in CG and animation in Zimbabwe. Chapter three is data presentation and analysis of the growth pattern of computer graphics and animation. Chapter four will be the conclusion and it will provide a summary of the research findings as well as offer some recommendations.

## **1.8 Conclusion**

This chapter covered the introduction, objectives, research questions, theoretical frame work and scope of the study and selected research methods in investigation into the growth and use of computer graphics and animation in Zimbabwe: Present and Future Prospects.

## **1.9 Definition of terms**

### **Animation**

According to Park & Gittleman (1992), animation can be defined as series of graphics that change over time and/or space.

### **Graphics**

Lih-Juan (1994) describes graphics as the use of images such as pictures, illustrations, diagrams, charts, tables, maps and similar visual representations in conjunction with written prose for the specific purpose of aiding understanding.

### **Learning**

According to Cooper (1998), learning may be defined as the encoding of knowledge and/or skills into long-term memory in such a way that the knowledge and skills may be recalled and applied at a later time on demand.

### **Computer Graphics**

Computer graphics are graphics created using computers and the representation of image data by a computer specifically with help from specialized graphic hardware and software. Animation is a subfield of computer graphics. Animation is a graphic form created by means of 3D computer graphics, though 2D computer graphics are still widely used for stylistic, low bandwidth, and faster real-time rendering needs. Sometimes the target of the animation is the computer itself, but sometimes the target is another medium, such as film in this case. It is also referred to as CGI (Computer-generated imagery or computer-generated imaging), especially when used in films. (Adamson, 2001)

## **Chapter 2**

### **LITERATURE REVIEW**

#### **INTRODUCTION.**

The previous chapter was the Introduction. It provided the background to the study, the justification of the study, elaborated on the theories used in the study, and described the research methodology. This chapter is going to focus on a critical analysis of computer graphics and animation in Zimbabwe in order to establish the prospects of present and future growth pattern. The aim of this chapter is to offer a review of literature related to the following:

- Defining CG and animation.
- The role of CG and animation in film and television.
- The challenges faced by existing animators in Zimbabwe.
- The significance of CG and animation in film and television in Zimbabwe.
- The importance of having CG and animation education.
- The existing CG and animation institutions in Zimbabwe.
- Production pipeline in CG and animation in Zimbabwe.

## **2.1 Defining CG and animation.**

The definitions of Computer graphics and animation are indistinct at best. In general, people have an idea of what animation looks like, but people have different ideas about exactly when it becomes distinct from computer graphics. Some formal definitions are flawed because they are too specific, suggesting designs intended for a restricted usage. Other definitions suffer from being overly vague, and allow CG and animation to be interpreted as anything using typography or imagery.

### Computer Graphics

Computer graphics are graphics created using computers and the representation of image data by a computer specifically with help from specialized graphic hardware and software. Animation is a subfield of computer graphics. Animation is a graphic form created by means of 3D computer graphics, though 2D computer graphics are still widely used for stylistic, low bandwidth, and faster real-time rendering needs. Sometimes the target of the animation is the computer itself, but sometimes the target is another medium, such as film in this case. It is also referred to as CGI (Computer-generated imagery or computer-generated imaging), especially when used in films (Adamson, 2001).

### Animation

Animation is the change of an attribute that is known as a key frame over time. Multiple methods of achieving animation exist the rudimentary form is based on the creation and editing of keyframes, each storing a value at a given time, per attribute to be animated. The 2D/3D graphics software will change with each key frame, creating an editable curve of a value mapped over time, in which results in animation. Other methods of animation include procedural and expression based techniques the former consolidates related elements of animated entities into sets of attributes, useful for creating particle effects and crowd simulations; the latter allows an evaluated result returned from a user-defined logical expression, coupled with mathematics, to automate animation in a predictable way convenient for controlling bone behaviour beyond what a hierarchy offers in skeletal system set up. (www.digitaltutors.com)(2016)

Below are illustrations of the difference between 3D and 2D computer graphics by Nqobizitha mlilo. Computer generated imagery of below can be found on Digital data file accompanied with this document



**2D Computer graphics** still image created by Nqobizitha mlilo (2014)



**3D Computer graphics** Still image created by Nqobozitha Mlilo (2014)

To create the illusion of movement, an image is displayed on the computer screen then quickly replaced by a new image that is similar to the previous image, but shifted slightly. This technique is identical to the illusion of movement in television and motion pictures. Christian Darkin (Darkin, 2009) categorized the types of computer graphics and the corresponding techniques used in film as following in several categories that I recite below to complement our study.

Explanation Graphics according to (Zebreg, 2009), is a quite acceptable means to provide explanatory notes, ideas, as well as information when the available footage cannot portray it sufficiently well. The CG-animated explanatory supplements can be very exciting and creative; 2D or 3D; text, cartoon, moving characters it is up to the director, animator, artists, and their creativity, resources available, and the corresponding needs of what to portray. Such as CG type can arguably be fitting with any film style (Zebreg, 2009).



**An Explanation Graphic**, screenshot (Motion Graphics) created by Quinton Mutsinze for Mazda Amtec motors (2014).

Animation for Colour Shots is a general CG mechanism that is applicable and relevant to Many types of film and television production, especially if at some point there is more narration material than footage (Mittell, 2012). Mittell Jason further gives examples of such

colour shots, such as a 20-second 3D animation where the virtual camera rushes through a bloodstream of a patient and blood cells and others past can easily be used in many medical-related documentaries and be “on topic” and not boring. Similarly, in the crime-related documentary, one can animate a flythrough” a CG-generated building where the crime happened while narration is running and prior to when the real footage begins (Mittell, 2012).

Visual effects Reconstructions as opposed to the explanation graphics, are required in the absence of footage for the most prominent and necessary events to portray in the film and TV that could not have been possibly shot, physically inaccessible (the scale of cellular biology or the Universe), or too far in the past, e.g. the assault on Baghdad, dinosaurs, an assassination, the Big Bang, or if needed to show the fat molecules getting from a burger to one's thighs, the 3D animated CG reconstruction can help to portray such events in a film (Ollie Johnston, 2009).



**Visual effects Reconstructions** created by Miller (2015)

Text and Title Animation is commonly employed to bring up Film and TV titles, scene announcements, some short on-screen paragraphs or questions raised by the maker, and subtitles. An introduction to the film, its topics, and ideas are good candidates for this type of animation in order to set the tone the film is to proceed with. Some of the Motion Graphics techniques mentioned earlier can be very well applied to text as well here as the CG



techniques are typically common across the board, except the text animation is optional and can be just still (Hausmann, L. R 2012).



**Text and Title Animation** created by Quinton Mutsinze for Audius Mtawarira (blindfaith studios) (2015)

## **2.2 The role of CG and animation in film and television.**

Paul Wells states that animation is "arguably the most important creative form of the twenty-first century. It is the omnipresent pictorial form of the modern era". According to Maureen Furniss's (1999), despite animation's prominent status in everyday life, from television commercials to the recent spate of popular feature length animation films to various uses on the Web, the form itself has suffered a long history of systematic neglect both critically and academically. Frequently dismissed as nothing more than an entertainment form aimed at children, animation has rarely been considered worthy of sustained critical or academic attention. Over recent years this situation has gradually improved. An increase in the number of film festivals focusing on animation, and the establishing of the Society for Animation Studies in 1987 have helped to raise the profile and popularity of the animated form. Its critical and commercial status in Hollywood was recently recognised when it was granted its own Academy Awards category. However, despite this new critical interest serious academic explorations of animation are still relatively uncommon. Paul Wells is in fact individually responsible for many of the recent contributions to this topic. His publications in this field

include *Art and Animation* (1997) (as guest editor), *Understanding Animation* (1998), *Animation and America* (2001), and a forthcoming title *British Animation* (2002), as well as several shorter pieces.

With this view in mind the rapid advancement of technology has made computer animation available to the masses and the animation industry is one of the fastest growing industries. The demand for animated entertainment has expanded with the increase in broadcasting hours by cable and satellite TV along with the growing popularity of online TV. In the past, animation series were aimed at children aged nine and below. In recent years however, TV stations have been producing animation series for teenagers, adults and the whole family. Animation series like *The Simpsons* and *King of the Hill* have been successfully aired on prime time TV.

The development of society and people's aesthetic improvement, people's requirements for quality and style of television programs are also increasing. In order to increase the attractiveness and the power of television programs, three-dimensional computer animation technology is integrated into the TV shows. With the rapid development of computer technology, the computer hardware and software level have been constantly upgraded. Thus three-dimensional computer animation capability has also been increased, which can make TV programs very vivid and realistic .focusing on the origin and role of three-dimensional computer animation techniques in television programs and prospect in filming TV programs.

In a book by Shao, Q. Q., & Ouyang, L. (2011). *Master for 3DS MAX animation production* (p.64). States the below that:

Constant social progress and development, the audience feel at a loss when they watching various TV programs. Such enormous information is absolutely a challenge and a test to the tolerance of their visual and hearing senses. At the same time, there's more intensive competition among the TV stations, TV channels, and TV programs. All TV program production parties hope to be at the dominate position and remain invincible in the market competition. In order to achieve this aim, they must work hard to effectively enhance the visual impact which is composed by audio and visual elements. They also need to significantly increase the interest of these elements. The appearance and the development of 3D computer animation technology provide us with good conditions to solve this problem. Complying with the needs for TV program production, this technology is a symbol that TV

program production is more mature. The following paragraphs the use of 3D computer animation technology during the production of TV programs. (Shao, Q. Q., & Ouyang, L. (2011).)

### **To show to the Audience Audio and Visual Elements Through Images**

The principle of computer animation is to generate moving effects for landscapes and object while the static pictures are played continuously. Computer animation uses computer techniques during the processing and application of the animation. In this way, the splendid and colourful animation effects are produced. Most TV programs have their tiles and trailers. During the production of a TV program, the principle of an attractive beginning, the plentiful and rich middle part, and the strong and concise ending should always be adhered to in arranging the structure of or in handling the relationship of the beginning, the major part, and the ending of a program or a video. The materials obtained from site shooting will be edited through the use of 3D animation and synthetic means. The trick scenes are fabricated to make the whole program complete. Then the voice is put into the program. The audios and visual factors with pictures are shown to the audience within a short period of time. The audience are allowed to make effective identification so as to have deep impressions to the programs. The animation technique may, based on the rules of audio and visual language, perfectly combine the forms and the contents together. It also mixes the audio and visual factors like colors, lines, and music so that the audience can experience the strong impact from the audio and visual elements and have visual and hearing recognition and memory of the program. (Shao, Q. Q., & Ouyang, L. (2011).)

### **Improve Editing Efficiency in CG and animation**

An editing machine is an essential means for traditional TV program editing. It consists of a video player and a video cassette recorder. An editor uses the video player to choose a section of proper materials and record them onto the tape which was in the video cassette recorder in advance. Then he looks seriously for the next section. It would be much faster if the editing is done on a computer. Open Window/Timeline, and drag the related elements shown in the window to the relevant track. Put the elements which are connected with each other to the same track. With this editing method, the elements are put together for display. In case that cutting is necessary for some elements, use Razor icon in Window and click the mouse at the place where cutting is needed. The elements are split. Then select different parts and press "Delete". Polish the program with the skills of transition, filter, overlay, and special effects.

The whole editing is completed easily. The editing methods achieve great development under the role of non-linear digital editing technique on the computer. This technique allows an editor to record materials in a computer and uses a computer for editing. It makes use of the non-linear mode of film editing. The manual operation of scissors plus pastes is replaced with simple mouse and keyboards. The editing results can be replayed at the first time. Thus the editing efficiency is notably improved. This feature of non-linear editing has further development with the application of animation technology. By way of combined pictures, it makes the pictures more rich, solid and vivid, which in turn effectively satisfies the audience's psychological needs to the media. (Shao, Q. Q., & Ouyang, L. (2011).)

### **Conception and Originality in CG and animation**

Conception and originality are the key issues in animation production. In this process, techniques are the major way for the creative team to make artistic polishing of the programs. The artistic level of the production team is reflected in every aspect of the program such as the shape and the colour of an object as well as the color and the brightness of the whole picture. This requires the production team to make harmonized combination of science and art in the production process. On the one hand, they need to strictly follow the development rules of the objects themselves while creating an object and structuring its picture. On the other hand, they should give full play to their artistic imaginations on the basis of conforming to the science law by making the colours and the shapes in compliance with the audience's aesthetic psychology. For example, *Universe and Man*, a science program, makes a coordinated integration of science and art. It displays the scenes about the birth of the Earth and the evolution of life through the production of wonderful pictures. Without the organic combination of science and art, it would be very difficult to show to the audience such unimaginable pictures, which are hard to produce. Only in this way will the production team make it possible for the audience to be deeply attracted by the impact expressed through the pictures. (Shao, Q. Q., & Ouyang, L. (2011).)

### **2.3 The challenges faced by existing animators in Zimbabwe.**

In an interview with Nqobizitha Mlilo, by (Povo magazine 2011), his opinion on the appreciation of CG and animation, " I think people are still very ignorant of their abilities so the industry itself does not demand as much from the animators and 3D artists as they should. People are still stuck in their old way of thinking where they don't challenge the animator to

push the envelope of creativity. Its difficult to influence with commercials because half the time they will come from advertising agencies so you find that creative direction has already been signed off by the time it gets to you. All you are doing is producing what they want to liven up their storyboards, stated (Mlilo, 2011)

According to a research by (Paula Callus of Bournemouth University on animation in the world), cites that challenges facing animators in Africa vary depending on the country. In Zimbabwe, barriers include a lack of training facilities and institutions that offer animation courses, along with a subsequent lack of production-ready talent; a dearth of investment in local series and commercials; and an economic situation that makes it difficult and expensive to buy equipment and software. Meanwhile, local animation houses face competition from international studios, since networks and other distribution channels rely mostly on foreign fare, particularly for children, and animators in most countries have very little or no government support. In addition, many talented animators end up leaving the country for greener pastures in South Africa, Europe or the U.S.

Animators in Zimbabwe also have to deal with a lack of recognition from the international community. " There is a perception internationally about Zimbabwe and Africa as a whole, that it is a third world country and continent, not able to produce anything of interest," (Greyling Triggerfish 2010) says.

"We've got the talent, we can do the work we just need the rest of the world to switch onto that fact," agrees Forrest (Joe public 2008)

Solomon marimba (JAAG, 2012) believes one of the major challenges facing the local animation industry is the cost of broadband in the country, which pushes up production costs and discourages international work from coming into the country. Another challenge is lack of support from the national broadcaster.

From what I have learnt a country like South Africa the national broadcaster is required to broadcast local animation and pay premium prices for it. This has boosted their industry to be one of the best in africa. It's a challenge for animators to educate the government on the huge employment potential of the animation industry." (said Mlilo in apovo interview)

In a statement “says an animated feature film can employ about 100 people for up to three years. “If we work closely with government and they’re supportive of what we do, the only way is up,” concludes Solomon maramba.

Mlilo thinks the biggest challenge is getting more work to grow the local industry. “At the moment the market is a shrinking resource. The local market can’t sustain the number of animation shops in the country, and I don’t think there are any decent studios here that aren’t looking off shore for work. With the recession overseas, shops there have dropped their prices dramatically just to stay afloat. So our exchange rate advantage is no longer a selling point.”

According to Michael Mupotaringa ([www.mcpotar.com](http://www.mcpotar.com)) a 2D animator the industry needs more cohesion and support. “Budgets are cut and investors are few,” he notes. [www.mcpotar.com](http://www.mcpotar.com)

Solomon maramba says the industry still faces a shortage of skills and the country can’t really sustain more than one feature in production at any one time.

“The key is to continue to improve the quality of training, which is expensive, and to make the most of our diversity as a country through transformation within the industry.”

According to an interview publication by povo magazine, “POVO: What is the current status of the the animation industry in Zimbabwe and future prospects? (2011)  
**NQO:** The animation industry is represented through the Joint African Animation Group (JAAG), the first official Zimbabwean animation association, which I founded with Solomon Maramba and Malvern Danda. We set up a Facebook group that is now 80 members strong. other structures we support are the Zimbabwe International Film Festival (ZIFF) through workshops, production focus and awareness campaigns and presentations at HIFA. We have done a few baby steps, but the baby steps which we have done have been very organized and they have inspired a lot of interest in the industry now, in such a way that people see it as a possible career option. As JAAG we are working on an animation festival in July in partnership with Alliance Franca is as well as American Pixel Corps founder Alex Lindsay.”

## **2.4 The significance of CG and animation in film and television.**

Computer graphics and animation such as cartoons became an established television feature, they have been the source of two major controversies: commercialization/merchandising and violence. Nintendo-educated children (Butler,2008).

While children are watching cartoons, there is a form of learning process that is going on. Whatever children learn while watching cartoons, they tend to act out thereby influencing their mode of socializing with other children and with the world in general. Baran and Davis (2009, p.217) citing Horace Newcomb's book *Television: The Critical View* said "this book has useful insights produced by researchers in popular culture, emphasizing that popular media content generally, and television programming specifically are much more complex than they appear on the surface.

The above means that there is a lot more than goes on when a child is watching a cartoon. Some level of learning is going on. This will in turn affect the development of the child's social behaviour as a whole. Baran and Davis (2009, p.200) argue that "Animation has become a primary means by which, many of us experience or learn about many aspects of the world around us. Even when we do not learn about these ideas of the world from the media, we learn from other people who got their ideas of the world from the media". An American study found that many cartoons can be harmful to the mental health of children under the age of 7, as they have difficulty distinguishing reality from fantasy as seen on television (Federman 1998, p.10).

Wilson (2008) also explores how media exposure affects children's social development. It was established that violent television programming contributes to children's aggressive behaviour. There is also an indication that playing violent video games can have the similar harmful effect on children. Invariably, if children spend time with educational programs and situation comedies targeted to youth, such media exposure can have more prosocial effects by increasing children's altruism, cooperation and even tolerance for others.

## **2.5 The importance of having CG and animation education.**

According to Jacquelyn Ford Morie (Rhythm and Hues 1999) the following are abstracts of the importance of CG and animation education. "One of the faster growing segments of the

job market for graduating Film majors over the past six years has been that of the technical director or software specialist for the television industry.” Jacquelyn Ford Morie

Students to fill these needs within the industry have been in short supply throughout this time. Many companies have had to look overseas or to related industries such as aerospace or other engineering disciplines to find the talent they required during what has been an unprecedented growth period within digital entertainment. This hiring burst of recent film graduates, at all levels, has brought with it a range of higher salaries, which, in addition to the high-profile nature of the jobs (from screen credits to the glamour of Hollywood), has left a shortage of these same students to populate positions in more traditional fields, such as defense, or CAD/CAM applications.

The skill sets necessary to be a successful technical director or software developer in the entertainment industry are also fairly wide range. While any given job may not absolutely require all these skills, knowledge or understanding of them will significantly improve the efficiency with which the job is done, thus maximizing the value of the employee to the company. The following listing of additional skill sets beyond those of traditional computer science programs is drawn from the most common requests and observations received from supervisors during production. Jacquelyn Ford Morie (Rhythm and Hues 1999)

### **Communication, Social and Management Skills**

This is an extremely important set of competencies and often the ones that have the most bearing on an employee's eventual success or failure. These skills include: how to work with artists, and producers, and directors; understanding the demands and rigors of production schedules and how to work within them; coping with extremely short research and development times; keeping confidentiality; and accepting criticism in a constructive way, by using it as a tool to improve the quality of the work. It is often difficult for new employees to work long hours, not talk about what they are doing with their friends, and realize that the director is always right, even as they redo a shot for the twentieth time at one o'clock in the morning. And technical directors often require strong management skills to lead those working under their direction, including knowing how to inspire a team of people facing the above pressures to push their artistic and creative limits to maximum effect. Jacquelyn Ford Morie (Rhythm and Hues 1999)



## **Artistic Skills**

**Aesthetics** The best TDs are those who understand artistic fundamentals and have developed a strong sense of aesthetics. At a minimum, TDs need to know how to value the art skills of those they work with, and collaborate with artists for the best results. But understanding the art themselves is best. A fundamental comprehension of design concepts provides a significant advantage for TDs. Most all TDs would also benefit from knowing colour theory, and more colour theory. It is difficult to find experts in this who understand the whole colour picture, as it is taught so differently within different disciplines, when it is taught at all. Film students need to understand about colour psychology, colour spaces that artists deal in, and color phenomena as well as gamma and wavelengths. Lighting is another area in which TDs need artistic training. Lighting TDs are in extremely short supply, typically because those who understand how to use the lighting tools, such as Render man and maxon raytrace an application used, do not usually have the co-requisite skills for manipulating light in aesthetic ways. Jacquelyn Ford Morie (Rhythm and Hues 1999)

## **Learning and Research Skills**

In addition, TDs will consistently be called upon to invent something that has never been done before. The best TDs are those who can make ingenious and intuitive leaps that bring unseen visions to life. They need to understand what has gone before and how to put seemingly disparate pieces together. And they will always be expected to keep up their skills, learning or writing new software on very short time frames. Jacquelyn Ford Morie (Rhythm and Hues 1999)

## **Specific Job Skills**

Some specific topics that TDs should know include: scripting and expression writing to creator control images; modeling complex, organic objects and how continuity is kept across such surfaces; enveloping, or developing the final "skin" around an animated character; rigging characters for animation, which is setting up intuitive controls for animators to use; procedural modeling using such tools as particles or implicit surface techniques; detailed shader and texture writing, which creates the final look of an object or character; pixel mathematics, which are used extensively in compositing operations; and working with 2D and 3D spaces and their interactions, especially in techniques such as 3D tracking. It is also imperative for TDs to understand how film work how it is exposed and scanned into the

computer as well as how to correctly output digital images to it. And last but not least, an understanding of the entire production process is extremely helpful. Knowing how and why certain decisions are made for a particular scene before it ever gets to the point where the digital manipulations occur can simplify the TD's task. Add to these areas an understanding of how to decide which tool is best for which job, since CG may not always be the best choice, or when to choose one CG tool over another. For example, modeling an asteroid is easier using simple geometry and a clever shader rather than a model with ten thousand polygons, and blowing up a building might be simpler to achieve with a practical, miniature model than with CGI. Jacquelyn Ford Morie (Rhythm and Hues 1999)

## **2.6 The existing CG and animation institutions in Zimbabwe.**

According to Wikipedia a reliable source for the findings of this topic Nafuna is the only existing CG and animation institution in Zimbabwe. Although they are groups and small studios that have been started by scholars and upcoming animators, Nafuna being the only notably institution.

Nafuna Investments P/L was founded by Nqobizitha Mlilo in July 2012 and is a young multi award winning digital media startup organization in Zimbabwe. Nafuna operates in 3 main areas; Studio Nafuna is at the heart of the Nafuna brand. The studio focuses on delivering digital media services to its clients. Studio Nafuna provides Digital video production, digital design, Animation and visual effects services. Their 2nd area of influence is content creation under the brand NafunaTV. Under this brand they create TV Shows, Documentaries and Viral Videos for the African and international audience at large. Thirdly, the company places emphasis on the development of the African digital media industry. This is done through Nafuna Campus, the company's educational initiative where the aim is to educate at least 100 digital media artists a year.

The basics of a 3D production pipeline are essential for the growth of Zimbabwean computer graphics and animation and for new filmmakers looking to either starting to learn the entire production pipeline

This project explores the production pipeline used to create a short or feature film in animation studios. Each part of the process is described with examples from previous workand from the animated short "Croak," which was created with Autodesk Maya and Final Cut Pro.

The short can be found here:

<http://www.youtube.com/watch?v=a1cWI4bogUU>

by(Nora Willett, Ivan Lee, Oliver Castaneda) (2005)

Aswell on the Digital Disc, that contains a visual illustration of CG and animation.

## **2.8 The Steps in the Animation Production Pipeline**

### **Story Boarding**

When a film is in its beginning stages of production, the storyboard is one of the first aspects to be completed. The story board, a series of pictures with captions that describe the outline of the story, helps in the placement of cameras and the timing of animation later on in the production process. The story boarding process begins with an initial rough draft. Then, one of the creators acts out and describes the pictures in the story to his or her colleagues in order to receive feedback. After taking into consideration the suggestions presented, the story board is redrawn with the new ideas. This process is repeated until a final story is agreed upon.



One part of the story board for "Croak."

### Voice recording

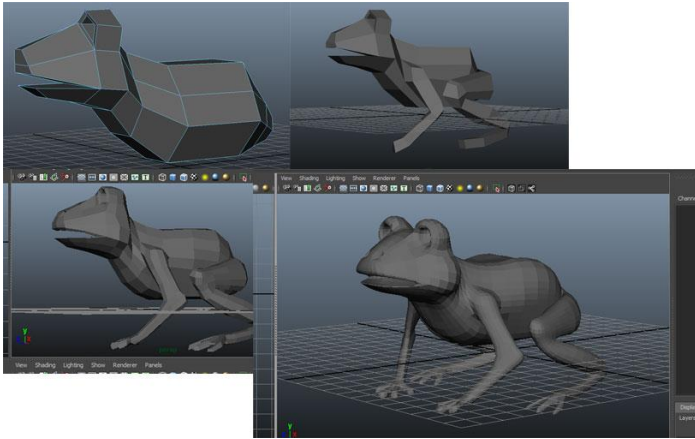
Before the animators begin working on the different scenes, the voices are recorded for the film. Before the actors are brought in to record the lines, people within the studio record scratch voices. These recordings allow the animators to gain ideas for the action based upon the movement of the actors. The recordings also influence the timing in the scenes.

### Concept Design

Concept design is the process where artists visualize what the director wants the film to look like. In this process, the characters and environment are created through sketches. Later on, the modellers use these sketches as guidelines when they create models in the computer.

### Modelling

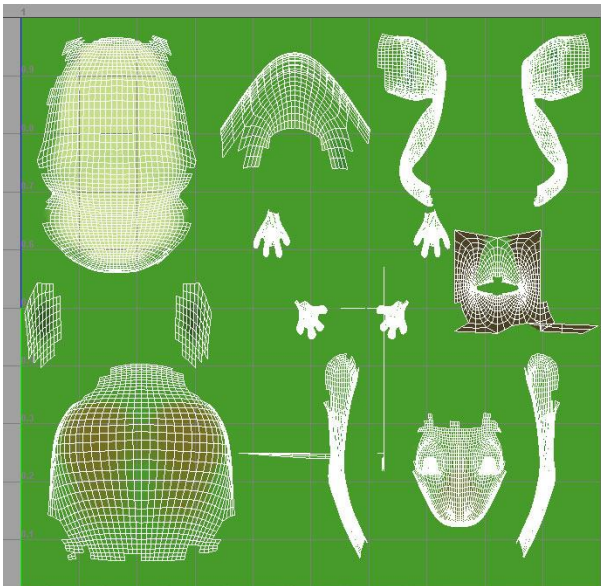
Given the sketches of the characters, modelers use programs such as Autodesk Maya and 3D Studio Max to create the 3D computer characters. When modeling, the base object can be chosen from a cube, sphere, cylinder, cone and a other options. Through the manipulation of vertices, faces, and edges, the original mesh is transformed into the final character.



The transformation of the real frog in "Croak" from its beginning stage to the final result.

### Texturing

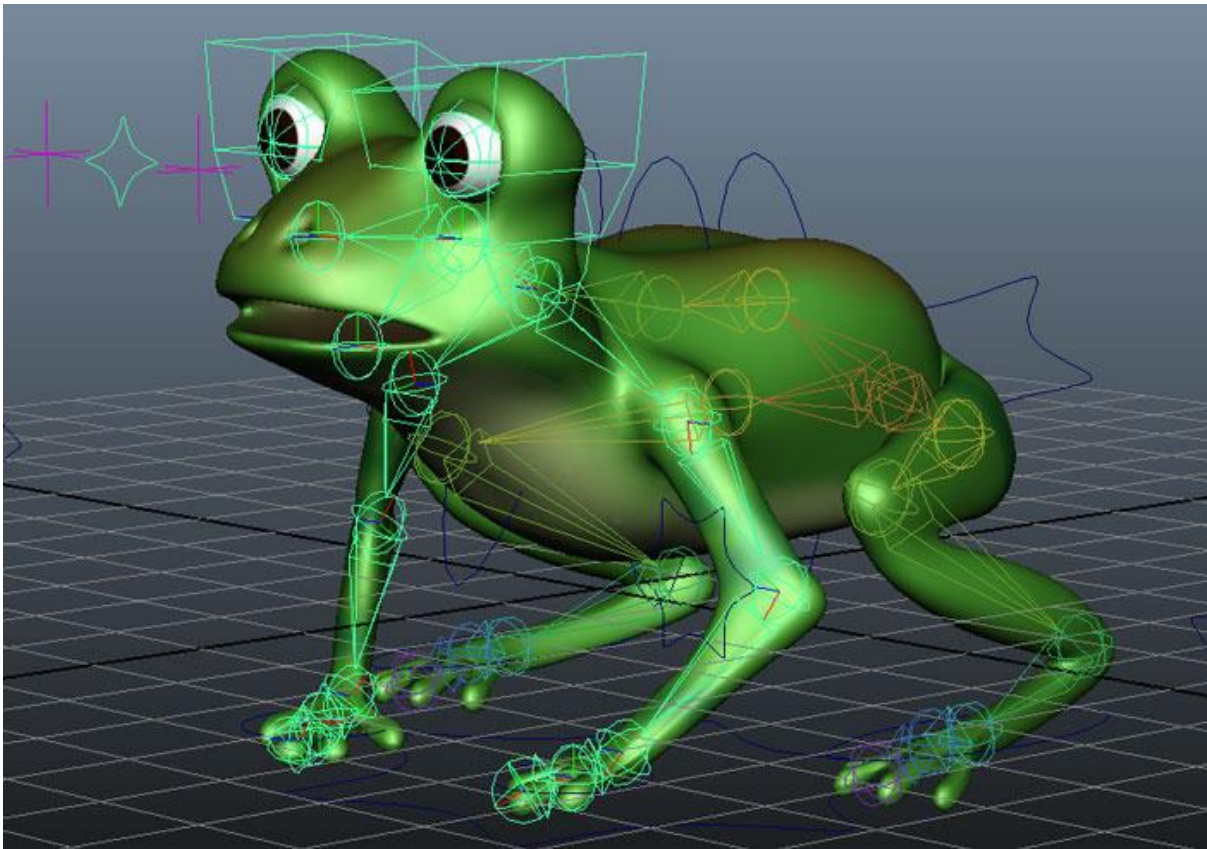
For texturing, one must "unwrap" the mesh into 2D and then paint in either 3D or 2D.



### Rigging

There are two parts to rigging a character for animation in film. One is constructing the skeletal rig of the model. The skeletal rig is made from joints connected together. When rigging you can choose to use a combination of inverse and forward kinematics. Inverse kinematics is usually used for legs since this allows the animators to place the foot in the correct spot and the rest of the leg will follow. Forward kinematics is usually used to rig the arms and the back. This type of rigging requires the animator to move every joint individually. Once the joints are connected properly, the rigger adds controls to them. This allows the animator to key only the controls and not to worry about the joints. Once the joints

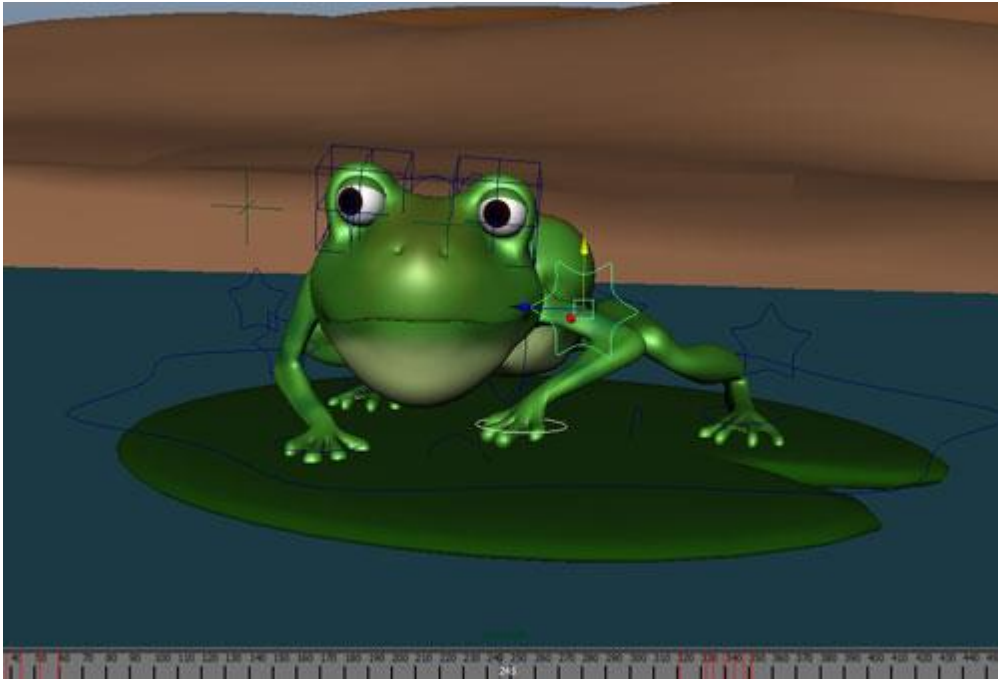
are connected to controls, this rig is connected to the mesh through "skinning" and then the rigger must paint weights to specify how the joints affect the mesh geometry.



Secondly, we need to create the extreme positions, or modes, of the face to give our character expressions. Maya and C4D interpolates between these extremes, called "blend shapes" to allow us to combine different shapes in different proportions and make new expressions:

### **Animation**

Once we have our models, our scene and cameras set up, we can start animating based on our storyboard. Unlike in traditional animation where the animator must draw each individual frame, in computer animation the animator only sets the main key frames and the computer "tweens" between them

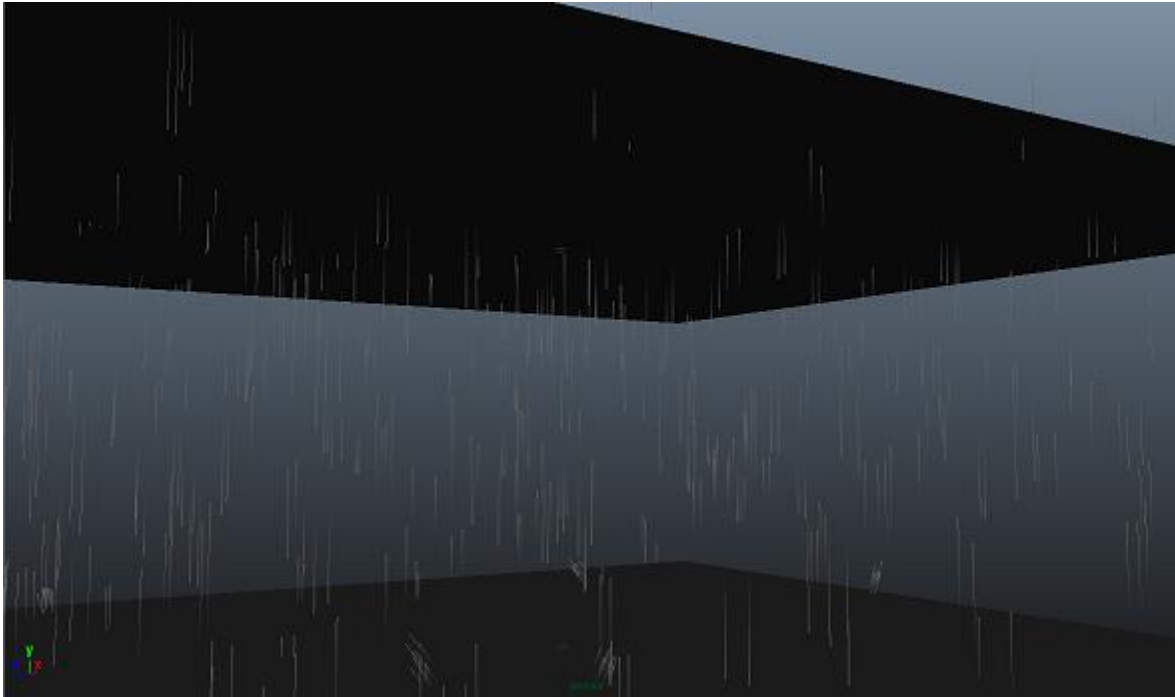


Autodesk Maya and C4D gives animators the graph editor and the dope sheet to help with animation. The graph editor is used to change how the computer interpolates between the main key frames set by the animator. The dope sheet is used to change the timing of the animation.

## **Special Effects**

Maya 2011 provides a number of powerful tools for the simulation of water in Maya. Given the numerous varieties of water, we will begin with a focus on river and waterfall simulation here, and touch briefly on other water effects at the end.

Water simulation can be approached in a number of manners. Useful tools include particle emitters, the relatively new nParticles, Maya fluids, and the builtin ocean and pond shaders.



Particle emitters can be the most efficient method of simulating fluids. Particle effects produce a vast number of individually customizable particles. Maya is flexible enough to calculate for particle collisions, random lifespans, and display attributes such as faded tail lengths. Shaders can be used to colour individual particles as well. At the same time, there is no calculation of inter particle effects, and despite randomizable initial parameters, each particle acts individually.

Maya fluids are built in to Maya (2011) to allow users to quickly create containers filled with predefined fluids. Such are also often very render efficient and have properties such as Density and Velocity that are common to fluids. The fog displayed in this project is accomplished using Maya fluids.

nParticles were introduced in Maya 2009 as a powerful new tool for fluid dynamics. An nParticle is generally much larger, having its own mass, collision densities and collision radius, and numerous other attributes. More powerful Mental Ray shaders can be assigned to an nParticle, allowing for more flexible display properties. Upon finalizing the display properties of the nParticles, the nParticles are then converted to an output mesh which attempts to generate a smooth meshes for every cluster of nParticles. Important attributes at this stage include surface tension, which determines how taut the surfaces remain. You can see to the right a transparent shader creating a dynamic, transparent liquid flowing smoothly.



## Lighting

Lighting is a very important part of the pipeline since it contributes to the feeling of a scene. There are many different types of lights that are available to artists as they create the mood in a shot. These types are: ambient light, directional light, point light, spot light, area light, and volume light. For each light, the colour and intensity can be changed to customize it. With spot lights, the cone angle and drop off can also be changed. Lighting with a computer offers several advantages over lighting in real life. Lights can only shine on certain objects and the artist can choose which light casts shadows. With so much control over the lighting in a scene, the artist can create whatever mood is desired by the director.

The changes that result from adding lights to a shot in "Croak."**Rendering**

When you have reached the time to render your shots, you are almost done! Autodesk Maya offers Maya software, Maya Hardware, and Mental Images Mental Ray as the renderers that you can choose from. You also have the choice of rendering from inside Maya or rendering from the command prompt. Rendering from the command prompt offers definite advantages since you can render multiple files right after each other. Rendering outputs a picture file for every frame.



The first picture is rendered with Maya Software and the second is rendered with Mental Ray.

## **Editing**

During editing the whole film comes together. In the steps up to the final editing process, a minimal amount of editing has already been done. Once the storyboard is complete, each picture is scanned into the computer. These are then edited together with the voice recordings and some sound effects to create an animate that gives the director and those working on the film a rough idea of how it will look. While the animators finish animating different shots, they play blast (create a rough video of) the shots. These play blasts are inserted into the animatic where the storyboard drawings were. Finally, as the shots are rendered, the final frames are put into the animatic. Through this process, the rough animatic transforms into the final film.

## **2.9 CONCLUSION**

This chapter provided the literature review investigation into the growth and use of computer graphics and animation in Zimbabwe: Present and Future Prospects It offered review on the Defining CG and animation terms, the role of CG and animation in film and television. The challenges faced by existing animators in Zimbabwe. The significance of CG and animation in film and television in Zimbabwe. The importance of having CG and animation education. The existing CG and animation institutions in Zimbabwe and Production pipelines that exist in CG and animation in Zimbabwe. The next chapter on methodology will seek to identify research methods and their justification in this study.

## **CHAPTER 3**

### **DATA PRESENTATION AND ANALYSIS**

#### **3.0 INTRODUCTION**

This section will present and discuss the data that was collected from the respondents through either questionnaire or interviews schedule and observations made by the researcher on the growth and use of CG and animation in Zimbabwe. The data to be presented and discussed was collected from different age groups and from people with different academic qualifications that made this research more valid because of the existence of Television reception aswell of film respondent devices country wide.

#### **3.1 EFFECTS OF THE GROWTH AND USE OF ANIMATION IN ZIMBABWE: PRESENT AND FUTURE PROSPECTS**

When people are watch animated related content, there is a reception learning process that is experienced unconsciously. Animated content is more applying to the receptive brain cells hence people in Zimbabwe prefer animated content which is more visible on “video on demand” platforms. Audiences that watch alot of animated content, tend to have been influenced by the mode of socializing portrayed in Television and films. Because of this Socialization influenced by CG and animation, the local film and television industry has suffered a loss on viewership to the audience preferring Digital satellite television and video on demand such as youtube and Netflix, which has television content that is made using Computer graphics and animation, 70% of the production being accounted for by CG and animation. The growth of CG and animation will bring the film and television industry to the current age of the industry as the same level and maturity its competitors are currently. Below are illustrations of 2D and 3D based computer generated imagery.

2D ILLUSTRATION  
OF DR MUSHORE(MSU)  
BY QUINTON MUTSINZE



AFTER



BEFORE

2D ILLUSTRATION  
OF DR RWAFA(MSU)  
BY QUINTON MUTSINZE



AFTER



BEFORE

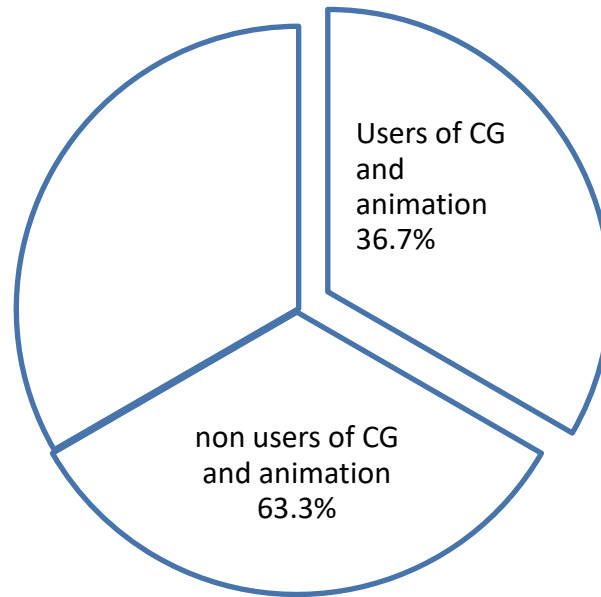
### 3.2 RESPONSES TO DEFINITION OF CG, ANIMATION AND ITS IMPORTANCE IN FILMMAKING?

On this question of defining CG, animation and its importance in Filmmaking, the questionnaire was mainly targeted at people with degrees, diplomas, active digital artists and undergraduates studying film. They where several responses from the targeted populace. The table below shows the responses to the definition of terms in CG and its importance in filmmaking

<b>Level of Education</b>	<b>Those who do not know the definition of CG</b>	<b>Those who know the definition of CG</b>	<b>Number of respondents</b>	<b>CG use per academic group (average)</b>
A level	12	3	15	20
Diploma	12	8	20	80
Undergraduate	15	5	20	25
Digital Artists	5	7	12	58.3
Degree	5	3	8	37.5
Total	49	26	75	36.7

**Table 3.2 Pattern of, knowledge of CG, animation and its importance, by different academic classes.**

About 36.7 of the target populace know the definition of CG and animation, and its importance the following chart shows the level of CG and animation knowledge.



**Figures 3.2 Knowledge levels of CG, animation and its importance.**

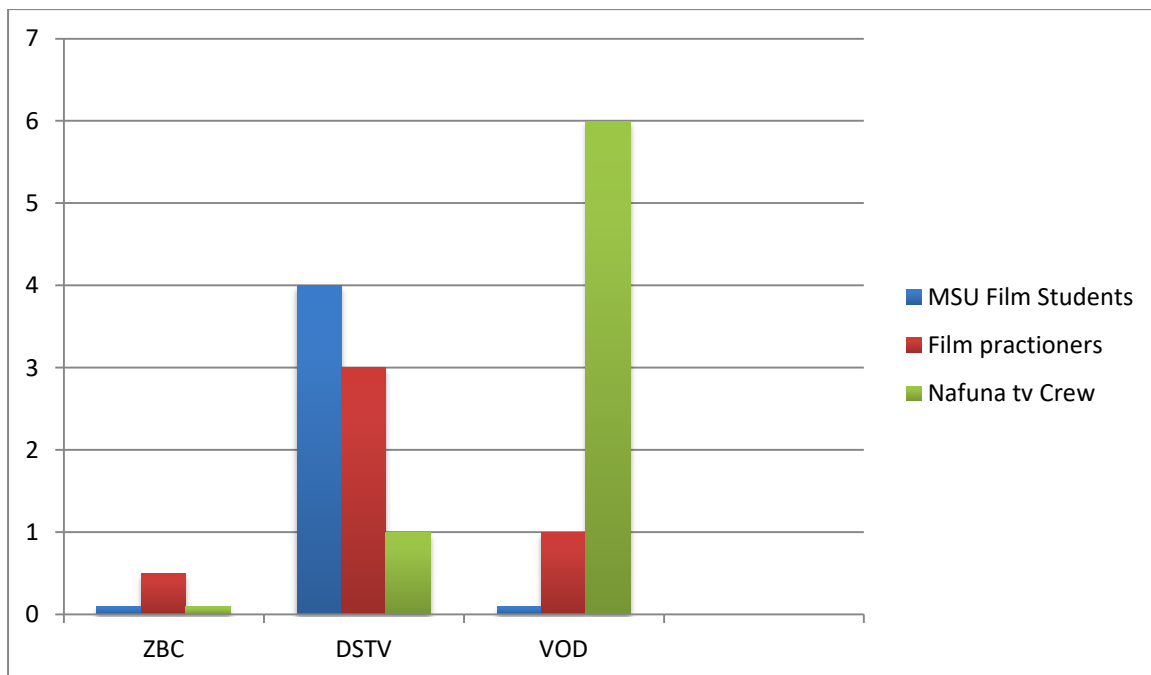
Active digital artists revealed that Computer graphics and animation are visual designs or illustrations, and the digital manipulation of computer generated imagery. In response to the importance of CG and animation in filmmaking, active digital artist highlighted that it has the potential to be a crucial backbone production pipeline for film and television production in Zimbabwe. Most respondents with Zimbabwean degrees, diplomas, certificates and undergraduates at Midlands state university, did not know the definition of computer graphics and animation hence they did not know its importance in filmmaking. Most of respondents in this particular category did reveal that animation is form of cartoon and highlighted that defining CG and animation was difficult, because they had not been taught and they had no articulate knowledge about Computer graphics and animation. According to the encyclopedia of (2013) defines computer generated imagery (CGI for short) is the application of computer graphics to create or contribute to images in art, printed media, video games, films, television programs, shorts, commercials, videos, and simulators. The visual scenes may be dynamic or static, and may be two dimensional (2D), though the term "CGI" is most commonly used to refer to 3D computer graphics used for creating scenes or special effects in films and television.

### 3.3 WHAT IS THE ROLE OF COMPUTER GRAPHICS AND ANIMATION IN FILM AND TELEVISION?

Views and responses on the role of computer graphics and animation in film animation, where fairly answered by digital artists of Nafuna tv. In an interview with Aura Mlilo the co founder of Nafuna tv, Aura mlilo concludes CG and animation facilitate opportunities to execute shots in film and television that would other wise be impossible with live action camera, such is called 3D camera tracking according to Maxon cinema 4D creators (2002). The bulk of midlands state university students film students where not sure how to answer, this question although most respondent of film student, assumed that animation is to make television and film look better” this answer was obtained from one of the undergraduate respondents. According to Finn Orfano the role CG and animation is to create special effects in live-action films, “this technology may be used in multiple ways, such as in animated title sequences and graphics, visual effects (special effects rendered in post production), optical effects (e.g. green screens and blue screens), and even mechanical effects such as rain or snow and prosthetics” concludes Finn orfano.

### 3.4 WHAT APPEALS TO YOU MOST LOCAL BROADCASTING CHANNELS OR DIGITAL SATELLITE TV OR VIDEO ON DEMAND?

The following table provides the data in scale range of 1 to 10 ( 1:10%)



### **Figure 3.4 LOD knowledge levels and appreciation of Zimbabwe animated content.**

One of the aims of this research was to determine extent to which Film students and film practitioners had been exposed to animations with a realistic LOD based on the Dimensional realism theory to assert the existence of world standard CG and animation. This was important as to determine if the different groups know what animated content is which points to the theory of visual realism which would therefore determine their level of knowledge of computer graphics and animation. Most Film students at Midlands state university, said they preferred DStv and digital artists from Nafuna tv 80% of the respondents preferred their own content which accounts to be “VOD” video on demand(online videos), which is more appealing to them. The research also revealed that film practitioners appreciated their own content on ZBC. Giving the researcher a rough idea of the quality expectations in the targeted populace, of their productions and identifying a quality growth pattern of film and television productions.

### **3.5 WHAT IS THE SIGNIFICANCE OF COMPUTER GRAPHICS AND ANIMATION IN FILM AND TELEVISION?**

In an interview with Nqobizitha Mlilo, he pointed several significances of CG and animation in film television. The use of animation in Zimbabwe has the potential to lower costs of production in industry hence solving the financing issues of film and television productions in Zimbabwe” mlilo (interview by researcher) He also said CG and animation is important in film and television as it does create time stamps on video, hence with the advent of CG applications video quality can be changed to suite the time or age of video productions either from 2000 pixels to 4000 pixels. Animation is also important as it communicates messages to the audience in the most desired way and intended way by the director of screenwriter, animation become a very important in the upbringing of children in today's age. Therefore script writing for animation is one of the most crucial parts of pre-production process of animation. Digital artists and film students felt the words significance and role, where the same hence they failed to answer this question, the target population that could answer this question 80% percent of digital artists at nafuna tv did not have degrees hence an assumption by the research felt the language may have been ambiguous, thus they did not understand the different meaning of the words that pertained to computer graphics and animation.



### **3.6 WHAT IS YOUR FAVOURITE ZIMBABWEAN ANIMATED FILM OR TELEVISION PROGRAMME?**

Most film students of (MSU) most preferred animated content was, Magaba and Nafuna digital artist preferred their own animation production called angry mwana. This question was and is crucial so as to determine the relevance of having increased animated content as the above are the only existing if not the most known to the public. Hence showing the decreased pace of growth and use of CG and animation in television production with affects the Film and television industry, supporting the problem statement of the research.

### **3.7 HOW CAN COMPUTER GRAPHICS AND ANIMATION ENHANCE THE PERSUASIVENESS OF FILM AND TELEVISION?**

CG and animation in Zimbabwe is commonly found and more visible in adverts mostly motion graphic based adverts hence persuasiveness is experienced in Zimbabwean adverts. From the questionnaires and the interviews that was done with the Nqobizitha mlilo mentioned that animation cooperates element such as colour, images, font type and words with meanings which are conventionally shared if they are to enhance the persuasive power of their productions. Some respondents to the questionnaires and interviews which were done alluded that advertisers that use animation, for them to avoid sending wrong signals to the community or stereotyping other people they should try to use neutral words and images in their advertisements. The researcher noticed that there is an outstanding response in terms of culture, religion and class. The respondent to questionnaires suggested that advertisers for them to avoid such misinterpretations and stereotypes they should always use various images portraying various cultures and classes since this affect the meaning of the message being sent to the potential customers. In other words, the advertisers should use animated multicultural and multi-class images to represent the target message.

### **3.7 CONCLUSION**

Chapter three has presented and discussed responses which were gathered through questionnaires sent out to Nafuna tv, and midlands state university. The chapter also presented and discussed responses from interviews which were conducted the researcher and the Founder of Nafuna tv and other film practioners Zimbabwe. Lastly findings, from the observation or examination of existing animation productions and use of computer graphics in film and television production in Zimbabwe under study by the researcher were also listed and discussed. The next and last chapter is the conclusion. It will summarise the findings, makes conclusions and recommends ways of improving and growing the use of computer graphics and animation in Zimbabwe.

## **CHAPTER 4**

### **4.1 CONCLUSION AND RECOMENDATIONS**

This chapter presents a summary of the findings, conclusion and recommendation based on the results on the previous chapter.

The aim of this study was to investigate the growth and use of computer graphics and animation in Zimbabwe Present and future prospects. By finding out the understanding of computer graphics and animation by film practitioner. The second aim was determing how computer graphics and animation can improve film production in Zimbabwe. The third aim was to find out the current challenges faced by animators in Zimbabwe, and the last aim was to determine the future of computer graphics and animation in Zimbabwe.

In attempt to achieve the above mentioned aims four questions were asked and findings are as below

On the question regarding the importance of animation and computer graphics the study reveals that most respondents to questionnaires and interviews questions they did not know the importance, with a minimum average of students and that know the importance. Some respondents knew that animation is a form rhetoric device that is meant to persuade potential customers to buy the products, services or ideas being advertised in an animated production, with the same view be applied to television programming audience competition across TV stations. The second aim was to determine how computer graphics and animation can improve film production in Zimbabwe, respondent said CG and animation could increase the pace of the growth of film production quality and execution costs by at least 70%. Thirdly was to find out the current challenges faced by animators in Zimbabwe, the lack of local animated content is mainly caused by the absence of cost effective production, the lack of ICT equipment and facilities and the lack of people with skills in computer animation. Lastly one of the aims was to determine the future of computer graphics and animation in Zimbabwe, respondents in an interview had high hopes as there was an initiative that was started by British council in collaboration with nafuna tv with a series of regional training and production workshops. In a statement by the respondent said a later stage it will establish a regional centre for animation training and production to address the absence of a formal training institution in this field.

## 4.2 RECOMMENDATIONS

Despite efforts by regional broadcasters and the audiovisual community in Zimbabwe, animation programmes in Zimbabwe and in particular computer animated content are mostly imported from abroad. In order to address this lack of local content production, the following should be done:

- Universities should start initiatives that assemble resources and expertise for the production of animated content in Zimbabwe's.
- Institutions should also team up with international training institutions, which, in collaboration with regional animators, visual and performing artists, producers, children's programming experts and Zimbabwean broadcasters should developed specialized training curricula.
- Training and production workshop should be done, taught by animation experts from such as Maxon, Pixar and freemantle productions as this where the best CGI experts come from.
- Introducing media literacy as a core part of the curriculum. Just as important is an investment in art education and an early introduction to specific animation skills.
- Zimbabwean film institution should take advantage of Zimbabwean film and art festivals as places to have these workshops. The workshop's scope could include introduction to animation, drawing techniques, scriptwriting for animation and storyboarding and the practical realization of an animation project leading to the production of a short, original animation pieces.
- Pilot projects should be done and evaluated and feedback should be done to serve as a basis for the preparation for more projects phases, which will provide current and hands-on training and production cycles, and to establish a permanent centre for Zimbabwe computer graphics and animation.

### 4.3 REFERENCE

Kellner, D. (2000) *Hollywood Film and Society- American Cinema and Hollywood*. Ed. John Hill and Pamela Church Gibson. New York: Oxford University Press.

Adamson, Joe. Tex Avery: King of Cartoons. 1975. New York: Da Capo, 1985. (Alber).

Allan, Robin. Walt Disney and Europe: European Influences on the Animated Feature Films of Walt Disney. London: John Libbey, 1999.

*And Mixed Approaches* (4th Ed.). Thousand Oaks, CA: Sage.

Anderson, Christopher. Hollywood TV: The Studio System in the Fifties. Austin: University of Texas Press, 1994.

Animation. Eds. Carol Stabile and Mark Harrison. London: Routledge, 2003. 15-32.

Anonymous. Where to Get Multimedia Training in Europe. Brysur Marne:

Barrier, Michael. Hollywood Cartoons: American Animation in Its Golden Age. New York: Oxford UP, 1999.

Beck, Jerry and Will Friedwald. Warner Bros. Animation Art: The Characters, the Creators, the Limited Editions. New York: Hugh Lauter Levin, 1997.

Bell, Elizabeth, Lynda Haas and Laura Sells, ed. From Mouse to Mermaid: The Politics of Film, Gender and Culture. Bloomington: Indiana UP, 1995.

Bendazzi, Giannalberto. Cartoons: One Hundred Years of Cinema Animation. London: John Libbey, 1994.

Blanc, Mel. That's Not All, Folks! My Life in the Golden Age of Cartoons and Radio. New York: Warner 1988.

Built and Human Environment, University of Salford, UK.

Carim, Adeelah, Producer Magic Cellar. Personal Interview. 13 Jan. 2010.

Crawford, Alice. "The Digital Turn." Prime Time Animation. Eds. Carol Stabile and Mark Creswell, J. (2003) *Research Design: Qualitative, Quantitative, and Mixed Method Approaches*, 2nd ed. Thousand Oaks : CA

Darkin. "Smarter than the Average Form: Animation in the Television Era." Prime Time (2009)

Denzin, N. K. & Lincoln, Y. S. (2000) *Handbook of qualitative research*. Thousand Oaks, CA

- Denzin, N., & Lincoln, Y. (Eds.). (2005). *Handbook of qualitative research* (3rd Ed.). Thousand Oaks, CA: Sage.
- Discourse. London: Longman
- Eagleton, T. (1985). *Marxism and Literary Criticism*. London: Methuen & Co.
- Elizabeth, C (1975). *Feminist Film Criticism: A Reply, Screen, vol.16, No.1, p.138*. London: BFI Publishing House
- Ernst, B. (1986). *The Principle of Hope*. Cambridge: MIT Press.
- Fairclough, N. (1995) *Critical Discourse Analysis*. London: Longman
- Fiske, J (1987) *Television Culture*. London: Routledge.
- Foucault 1954–1984 (vol. III)*: New York, New York Press
- Foucault, M. (1972), *Archeology of Knowledge*, New York: Pantheon Books
- Foucault, M. (1978) *The History of Sexuality, Volume I: An Introduction, Vintage Books*: New York, New York Press
- Foucault, M. (2000) *Truth and Power. An Interview in 1976 with Alessandro Fontana and*
- Fredric, J. (1981). *The Political Unconscious*. Ithaca: Cornell University Press.
- Frierson, Michael. *Clay Animation*. New York: Twayne Publishers. 1994.
- Furniss, Maureen. *Art in Motion: Animation Aesthetics*. London: John Libbey and Company Ltd, 1998.
- Gerald, M, & Marshall, C. (1985) *Film Theory and Criticism*, New York: Oxford University Press
- Giroux, H. (1983) *Theories of Reproduction and Resistance in the New Sociology of Education: A Critical Analysis*: Harvard Educational Review, vol. 53, no. 3, pp. 257\_ 293.
- Goldman, B (1992) *Reading Ads Socially*. USA : Routledge
- Goodson, Lolli. *Acting Head of Children SABC*. Personal Interview. 21 Jan 2010.
- Gramsci, A. 1971. *Selections from the Prison Notebooks*. New York: International Publishers.

*Grundbegriffe* (München, Kösel), pp. 868–877.

Guba, E. G and Lincoln, Y. S (1994) *Competing Paradigms in Qualitative Research*: Denzin,

Hall S. (1997), *Representation: Cultural Representation and Signifying Practice*: London: Open University Press

Hall, S. 1994. *Cultural Identity and Cinematic Representation*. In *Exiles, Essays on Caribbean Cinema*. Cham, M. (ed.) New Jersey: Africa World Press

Harrison. London: Routledge, 2003. 110-130.

Hebdige, D. (1979) *Subculture: The Meaning of Style*, London, Routledge.

Hunter, Laura; Leahey, Erin (2008). "Collaborative Research in Sociology: Trends and Contributing Factors".

INA, various dates.

Inikori, J. E. (2002) *Africans and the Industrial Revolution in England: A Study in International Trade and Development*, New York: Cambridge University Press

Interview of Nqobizitha Milio, The Birth of animation in Zimbabwe Povo magazine (2012)

Jameson F. 1981. *The Political Unconscious; Narrative as a Socially Symbolic Act*. London, Methuen

Johnson, R. B., & Christensen, L. B. (2010). *Educational research: Quantitative, Qualitative,*

Kasim, R., Alexander, K. and Hudson, J. (2010). *A choice of research strategy for identifying community based*

Keller, D. (1998) *Critical Theory: Marxism Modernity*, Baltimore: John Hopkins University

Kellner, D & Michael, R.(1988) *Camera Politica: The Politics and Ideology of Contemporary Hollywood Film*. Bloomington, India: Indiana University Press

Kellner, D. (1990) *Television and the Crisis of Democracy*. Boulder, Col: West view

Kellner, D. (1978) *Ideology, Marxism, and Advanced Capitalism, Socialist*

Kellner, D. (1979) *TV, Ideology, and Emancipatory Popular Culture, Socialist*

Kellner, D. (1995) *Media and Culture*. London: Routledge

Kellner, D. (1995) *Media Culture. Cultural Studies, Identity and Politics between the Modern and the Postmodern*. London and New York: Routledge.

Kerlow, V. Isaac. *The Art of 3D Computer Animation and Effects*. London: Sons. 2003.

Kharas, Firdaus. "Re: Thanks". Email to Roland Kangong. 12 Jan 2010.

Kitzinger, J. (2005) *The Methodology of Focus Groups*. London: Sage

Kumar, R. (2005) *Research Methodology: A Step- By-Step Guide for Beginners*, London: Sage Publication

Lasseter, John. "Principles of Traditional Animation Applied to 3D Animation." *International Conference on Computer Graphics and Interactive Techniques* 21. 4 (1987): 35 – 44.

Laura, J.M & Asher, J.W (1988) *Composition Research: Empirical Designs*. Oxford: Oxford Press University

Leedy, P. D & Ormrod, J.E (2014) *Practical Research Planning and Design* 10<sup>th</sup> Ed. USA: Pearson

Lincoln, C, G (1994) *Hand book of Qualitative Research* .Thousand Oaks, CA: Sage

*Looney Tunes and Merry Melodies: A Complete Illustrated Guide to the Warner Bros. Cartoons*.New York: Henry Holt, 1989.

Luhmann, N. (2004). *Law as Social System*. (Translated by Ziegert), KA. Oxford: Oxford University Press

Marx, K & Engels, F (1978) .*The Marx-Engels Reader*, edited by Robert C. Tucker 2<sup>nd</sup> edition .New York: Norton.

Mertz, C (1974). *Film Language: A semiotics of the Cinema*. (Translated by Michael Taylor). New York: Oxford University Press Mohr).

Mulvey, L. (1988). *Visual Pleasure and Narrative Cinema* in Penley, C. (ed.) *Feminism and Film Theory*. New York: Routledge.



*Pasquale Pasquino*, in: J. D. Faubion (ed.), *Michel Foucault: Power: Essential works of*

Patton, M.Q. (1980). *Qualitative Evaluation Methods*. London: Sage.

Popitz, H. (1992) *Phänomene der Macht. Autorität—Herrschaft—Gewalt—Technik* (Tübingen,

Prasad, A. & Prasad, P. (1998) 'Everyday struggles at the workplace: the nature and implications of routine resistance in contemporary organizations', *Sociology of Organizations*, vol. 15, and pp.225\_ 257.

Press.

*Quantitative Approaches*. Thousand Oaks, CA: Sage

Raymond, W. (1998). *Culture Theory and Popular Culture*: Georgina: University of Georgina Press

Review 42 (Nov-Dec), 37-65. London and New York: Routledge

Review 45 (May-June), 13-53.

Röttgers, K. (1990) *Spuren der Macht. Begriffsgeschichte und Systematik* (Freiburg/München,

Rwafa, U. (2008). *Lyrical film: The case of Tanyaradzwa*. In *Muziki. Journal of music research in Africa*. Vambe, M.T. & Rwafa, U. (ed.) Pretoria: Routledge & UNISA press. pg188-195.

Sage

Schwartländer, J. (1973) Art. Macht, in: von H. Krings *et al.* (eds), *Handbuch philosophischer*

Stam, R. (2000). *Film Theory: An Introduction*. New York: Blackwell Publishers

Tait, G. (2000) *Youth, Sex and Government*, Canterbury: Peter Lang Publishing.

Tashakkori, A., & Teddie, C. (1998). *Mixed methodology: Combining Qualitative and The American Sociologist*

The Walter Lantz Story, with Woody Woodpecker and Friends. New York: G.B. Putnam, 1985.

The Whole Toon Catalog. Chicago: Facets Multimedia, various dates.

The World of Hanna Barbera Cartoons. New York: Museum of Radio and Television, 1995.

Umberto, E. (1976) *A Theory of Semiotics*. Bloomington, India : Indian University Press

Umberto, E. (1977). *Quarterly Review of Film Studies*. New York: Redgrave Publishing Company

*Van Dijk, T.A. (1977): Text and Context: Exploration in the Semantics and Pragmatics of*  
Wells, Paul. *Understanding Animation*. Oxford: Routledge, 1998.

Willis, P. (1977) *Learning to Labour*, Farnborough: Saxon House.

Wodak, R.(1996). *Orders of Discourse*. New York: Addison Wesley Longman.

Zagreb '82: Retrospective Programme of Zagreb School of Animation. Zagreb: Zagreb World Festival of Animation, 1982.

### **Interview Questions for Questionnaire**

- Definition of cg, animation and its importance in filmmaking?
- What is the role of computer graphics and animation in film and television?
- What appeals to you most local broadcasting channels or digital satellite tv?
- What is the significance of computer graphics and animation in film and television?
- What is your favourite Zimbabwean animated film or television programme?
- How can computer graphics and animation enhance the persuasiveness of film and television?

## QUESTIONNAIRE INTERVIEWS

Nafuna TV Founder: Mr Mlilo. 15 April ,2016 10:30

Midlands State University: Dr Rwafa. 19 April, 2016 14:30

Midlands State University film Student : Ms N Shumba 24 April, 2016 12:30

High school drama Teacher : Ms Ndlovu 5 May 12, 2016 16:00

## ANNEXTURE 1 INTERVIEW QUESTIONS FOR FILMMAKERS QUESTIONNAIRE SCHEDULE

### QUESTIONNAIRE

My name is Quinton Mutsinze studying for Bachelor of Arts Special Honours in Film and Theatre Arts Studies Degree with Midlands State University. I am researching on a project entitled, **‘An investigation in the growth and use of Computer graphics and animation in Zimbabwe: Present and Future Prospects’**

Kindly answer the following question to the best of your knowledge. The information obtained shall be used only for the purpose of this research project and shall be treated with strict confidentiality.

DO NOT WRITE YOUR NAME ON THE QUESTIONNAIRE

Please tick or fill in the correct answer in the space provided.

### PART A

1. GENDER      Male       Female

2. AGE IN YEARS

Below 20 years

20 - 30 Years

31 – 40 Years

41 – 50 Years

Above 50 Years

3. WHAT IS YOUR HIGHEST ACADEMIC QUALIFICATION

- Below standard 6
- Standard 6
- O level
- A level
- Diploma
- Degree

**PART B**

4. Define Computer graphics, animation, and its importance in advertising?

.....  
 .....  
 .....

5. What is the role of Computer graphics and animation in Film and television?

.....  
 .....  
 .....

6. What appeals to you most Local Broadcasting channels or digital satellite TV?

.....  
 .....  
 .....

7. What is the significance of Computer Graphics and animation in Film and Television?

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 .....

8. What is your favourite Zimbabwean animated film or Television programme ?

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 .....  
 .....

9. How can Computer Graphics and animation enhance the persuasiveness of film and television ?

.....  
 .....  
 .....

Thank you very much for your valuable participation