EFFECTS OF MULTIMEDIA (MOTION GRAPHICS) VERSUS TRADITIONAL TEACHING METHOD ON STUDENT LEARNING

Comparing two group of undergraduate (freshmen) of Graphic Communications Department of Azad University

Hosna Khorsandi1 and Rezvan Khorsandi2 and Mohamad Amin Khorsandi3

[1]Department of Public Relations, faculty of Culture and Art Unit 30, University of Applied Sciences & Technology(UAST), Tehran, Iran

hosna.khorsandi@gmail.com

[2]Department of Graphic Design, Bachelure Student of Art, Shahid Rajaee Teacher Training University, Tehran

rkhorsa@g.clemson.edu

[3]Department of Graphic Design, Bachelure Student of Graphic, University of Applied Sciences & Technology(UAST), Tehran, Iran

amin.cinematography@gmail.com

*Abstract:-*Although multimedia has been around for a short time, they have created great changes in the human lifestyle. Multimedia could enter the education domain as a new method too. Motion graphic is one of the elements of a multimedia system that provides a creative possibility for learning and also contributes to knowledge development and learning ease. The purpose of this study is to look into the effect of motion graphics on learning color theory lessons in comparison with the traditional method. This survey is practical and experimental. Class A and Class B were selected from the freshmen of the Graphic Communications department of Azad University, each class with twenty students. The pre-test and post-test methods with the two control and experimental groups were used in order to determine the differences between the two classes. The results showed that there is not any significant difference between the mean of the class A and B scores. The subject of the visible spectrum from the lesson of color theory was taught for both class A and B. Teaching with the use of the traditional method for class A and teaching with the use of motion graphics for class B were done, and then the two classes answered the questions. T-test was used to investigate the difference between the mean of two classes' scores showing that the mean of the scores in the two classes increased in the post-test. The results showed that there is a significant difference between the mean of the scores of the two classes in the post-test. The mean of the scores for class B students was greater than that for class A students, showing the superiority of the graphic method of teaching

.Keywords—Motion graphics, Multimedia teaching instrument, Color theory, Traditional method, learning.

INTRODUCTION

Teachers can use digital footage in a variety of techniques to help teaching and learning. Animations, motion graphics, electronic grade books, digital portfolios, learning games, and real-time feedback on student and teacher performance are a few methods which digital media can be used to develop learning (Tinio,2003).

Motion graphics are bits of digital video or animation that make it look like something is moving or turning. They are usually put together with sound for use in multimedia projects. Currently, the motion graphic as one of the multimedia teaching methods could improve students learning outcome that helps the knowledge development in the communication era.

Most of the time, electronic media technology is used to show motion graphics, but manual powered technology can also be used (e.g. Thaumatrope, Phenakisto scope, stroboscope, Zoetrope, Praxino scope, Flip book). The term separates graphics that stay the same from those that change over time, without being too specific about the form. Even though the term "motion graphics" can be used to describe any kind of experimental or abstract animation, it is more often used to describe the commercial use of animation and effects in video, film, TV, and interactive applications.

Motion graphics has started to use a lot of traditional animation techniques, such as stop-motion animation, cell animation, or a mix of the two. This is because traditional techniques like collage and pastiche are important for learning. A particle system is a type of motion graphics technology that is used to make many animated elements. When it comes to animation, it is one of the go-to programs.This is procedural animation. Plug-ins, standalone apps, and motion graphics packages are available for particle systems. Particles are points in three-dimensional or two-dimensional space that can be represented by a sphere of light, a video clip, or a string of text. Depending on the project, a particle emitter can release hundreds or thousands of particles. A particle emitter can be a single point, a line, a grid, a plane, or an object like a box or sphere, but it can also employ a custom object like a logo, which can be exploded, melted, or turned into blowing sand. Trapcode's Particular is a popular particle system.

Depending on what the software can do, different ways can be used to animate parts of a motion graphics project. Some examples of these elements are art, text, photos, and video clips. The most common type of animation is key framing, in which properties of an object can be set at certain points in time by setting a series of "key frames" so that properties of the object can change automatically between key frames.

The term "multimedia" refers to any presentation that includes text, images, sounds, animation, and/or video coherently and effectively (Phillips, 1997).

Five benefits of multimedia learning:

1."Deeper understanding"

2. Better problem-solving

3. More pleasant feelings

4. A wide range of information is available.

5. Exploration of the globe

The traditional approaches limit learners to reading texts, listening to lectures and discussing ideas in seminars. However, multimedia methods could improve student's engagement in class that results in better learning in different ways such as, giving students an active task to complete, Providing watching or listening complementary material, etc (Jerinic,2014).

One approach to improve interactivity is using sound with animations and so on. This research evaluates the use of Multimedia method on students learning, creating an original story (that) using rainbow as natural example of visible light spectrum to explain wavelength, frequency, and energy level of visible light.

Literature Review

Morrison et al. (2000) showed motion graphic could be beneficial if carefully designed and readily comprehended. Motion graphics facilitates learning; however, in many cases, static graphics represented superior to motion graphics. The motion graphics conveyed detailed information, about the micro steps between larger steps. However, in many cases, animations have failed since they were tough to comprehend.

Haque et al. (2016) conducted a study in which they compared the effectiveness of the digital content teaching vs traditional teaching. Their study revealed that digital content teaching is as effective as traditional teaching in knowledge level learning; but it is more effective in comprehension and application level learning (Haque et al., 2016).

Leow to improve the student learning quality created an interactive multimedia learning method which she called "Multimedia-mediated student-centered learning environment" or MMSLE. Pre-test, post-test, questionnaire, open ended questions, and interview was used to assess the impact of the MMSLE method. The test results showed there was a major improvement in student learning as well as student participation in classroom (Leow,2014).

Kassim presents the results a of study in which the impact of multimedia learning on creative thinking performance on a group of mechanical engineering students. Index of learning style (ILS) was used to discover students learning styles. Kassim measured the efficacy of multimedia tools on education via the Torrance test of creative thinking (TTCT). According to the findings, "active, reflective, intuitive, and high visual students" benefited the most from using multimedia in their education (Kassim, 2013).

Liao analyzed 35 existing studies to assess the impact of hypermedia on learning quality compare to traditional teaching. His analysis showed use of hypermedia is more effective than traditional methods (Liao,2014).

Sharma performed a study in which she compared the results of computer multimedia teaching to traditional teaching. Her study confirmed the group exposed to computer multimedia teaching method did better in post-test compare for controlling cohort, which was subjected to traditional teaching (Sharma,2013).

Lin et. al. conducted a study in which they investigated impact of digital learning on learning and learning motivation. In their study students subjected to digital learning showed higher learning motivation and resulted in better learning (Lin et al.,2017).

The advent of technologies improved learning, despite the traditional method where the role of teachers and instructors is the most vital one (Waddell ,2015). The pattern that led to an infinite number of ways to use computer technologies was to include technological media in what is called "multimedia." When sound cards and compact disks were introduced, the notion for this technology arose.Then digital cameras and videos were invented, which made the computer an important tool for learning. Multimedia has grown so much that it is now its own field. The idea of using technology for more than one thing is old. Instead of employing each tool independently, multimedia programming might offer a more impactful and effective experiment. Researchers think that multimedia is one of the best ways to teach because it uses more than one sense at once. For example, it uses both sight and sound. Multimedia programs offer different kinds of stimulation in their presentations, which can include a number of things (Aloraini,2005) :

Texts

Spoken words

Sound and music

Graphics

Animations

Still pictures.

These aspects were included into an unified presentation in order to give high-quality training that encourages pupils to use their senses and participate in a variety of curriculums (Hadmin,2000).

Some of the advantages of multimedia teaching method are:

Instead of simply reading the text on the page, reading becomes an interactive experience using these tools (Zaitoun,2002).

Presenting different drawings and pictures supports the clarification of ideas and communication of information.

Moving easily from a presented subject to another provides a good chance for questions and discussions.

Using different presentations like video clips along with maps or other kinds of presentations help to get the information closer to reality. Adding music makes the idea cleaner and it attracts the attention of the learners. (Alorain, 2012).

They raise the attention and interaction between students and educational subjects. (Qandeel,1998).

They comprise the elements of amusement and suspense. (Qandeel,1998).

They are graded according to the learner's abilities from easy to difficult ones. (Qandeel,1998).

They provide teachers with a new educational style and encourage curiosity. (Holsinger,1995).

They help teachers and learners consider topics from a boarder perspective as each topic comprises enormous information. (Holsinger,1995).

They guide learners to peer learning. (Holsinger,1995).

They are concerned with providing simultaneous feedback. (Qandeel,1998).

They help learners remember and transfer their knowledge. (Alfar,2009)

They support the users work and innovation, which makes the possession of a computer a necessity for both the student and the teacher.

All of the elements utilized in multimedia have existed previously. Multimedia simply integrates these elements to create a potent new tool, particularly in the hands of teachers and students. Needless to say that by emerging more complicated modern tools the demand to provide new learning style receives more attentions. (Alorain, 2012).

The current survey's purpose is to find the motion graphic potentials in educational environment. Additionally, we attempt to show that how motion graphic opens new doors for teachers and instructors in the teaching and learning areas and also is there any difference between the students who taught by motion graphic and students who taught by traditional method?

Methodology and data collection

The current study is an experiment, and pre-test and post-test were used here.

The general goal of this study was to compare the learning of color theory between the students with the help of motion graphic and the students with the help of traditional method, aiming to improve their learning quality. Class A and class B were selected from the freshmen of Graphic Communications department of Azad university, each class with twenty students.

Freshmen students were selected to survey because they did not study the color theory lesson and if we selected the senior students for the survey, their knowledge of the color would affect our results because they passed the color theory before.

The instrument of survey was a researcher-made test including ten questions about the concepts of visible light spectrum from the color theory lesson.

A creative story about rainbow colors, wavelength, energy, frequency has been written to provide creative possibilities for teaching and learning also contributes to knowledge development and learning ease by using multimedia and digital art.

The topic of the visual light spectrum for color theory is chosen, since the rainbow is a fundamental and natural example of visible light spectrum wavelengths. A rainbow can be seen when rain is in front of us and the sun is behind us. Sunlight hitting a raindrop also gets refracted at the raindrop's surface and splits up by wavelength. So, a rainbow of colors in the sky is showing.

When the rainbow colors story script was finished, characterization and illustration were done for this story. Then the story plots were designed and made and the characters were animated. Finally, several other grad students have asked to read the script of each character and the narrators recorded and the voiceover edited. The video was uploaded to Vimeo and can be found at:
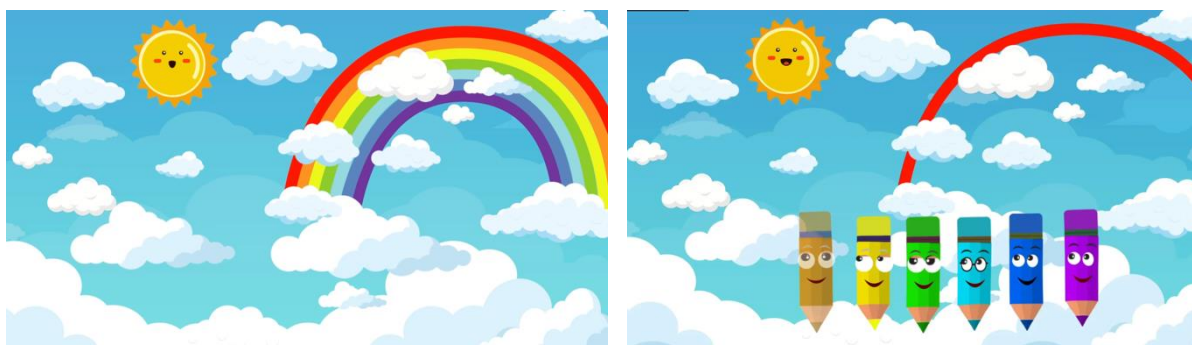
https://player.vimeo.com/video/378157060

Figure 1&2. The screen capture of created motion graphic
(The Story of the Rainbow; visible light spectrum)

Research Hypothesis

There is a significant difference between the effect of motion graphic and traditional method on learning.

A common theory is that the motion graphic can ease teaching, understanding and inferring.

Sampling

Sampling is done in order to collect the required data about people in the community and estimate the values of the community with the help of sample values. Sampling saves time and money and makes research simple and possible. If the researcher conducts a research on all members of society, the method will be of census type. That is, the researcher must examine and test all members of society individually. The cost, manpower, and time required to complete the count (for data collection) are generally not recommended. The smaller the size of the population, the greater the proportion of the population should be in the sample, and the larger the size of the population, the smaller the

proportion of the population should be in the sample. If the population size is 30 or less, the researcher should select almost the entire population as a sample. That is, use the census method. Since, in this study the size of the population was small, the census method was used to examine all members of society.

Validity and Reliability

Validity indicates that how well an instrument as measures what it is planned to measure. Validity of the test was performed by the teachers who taught this lesson in the university. Reliability, like validity, is a method of evaluating the quality of the measurement process used to collect data in a dissertation. In order for the results from a study to be considered valid, the measurement procedure must first be reliable. To determine the reliability of the questions, the test was performed on 20 non-sampled students, then Split-half test was used.

Split-half test: In this method, a test was split into two halves and the Correlation Coefficient between them was measured. To do this method, the 0 code was given to the wrong answers and code 1 to the correct answers. In this way, the content and difficulty of the questions were similar. The number of tool questions was divided into two parts.

SPSS which is a common statistical analysis software, was used to determine reliability using Cronbach's alpha or Split-half.

The reliability Correlation Coefficient Between the scores of the two tests was 0.74 and the reliability Correlation Coefficient of the whole test was 0.85.

$2*0.74 / (1+0.74) = 0.85$

Descriptive statistics and inferential

Descriptive statistics for describing the data and inferential analysis (t-test) for comparing groups mean were used to determine and investigate the significant difference between the groups. Pre-test was performed before the teaching in order to determine the students in the two groups were at the same level regarding the subject and there was not any significant difference between the mean of their pre-test scores. After teaching, the post-test questions were presented to the students in order to determine their learning based on the mean.

For both class A and B, the subject of visible light spectrum from the color theory lesson was taught. The traditional method was used for class A and motion graphic was used for class B and then both classes answered the questions. T-test was used to investigate the difference between scores mean.

The results of the post-test showed that the mean of the scores in both groups increased after teaching with significant difference between the mean of class A and B scores in the post-test phase. The mean of class B scores taught by motion graphic was greater than that of class A.

Dependable Variable: Motion graphic tools

Undependable Variable: Success in learning

Variables that should be controlled: Class teacher, class location, students' knowledge level, university.

Descriptive indices (mean and standard deviation) of color theory scores were determined in the pre-test and post-test phases for freshmen (first year students) in the traditional way and graphic motion; the results are presented in Table 1.

Table 1. The summary of student grade.

Phase	Mean	Standard deviation	Minimum	Maximum
Class A pre-test in traditional way	3.70	1.703	2	7
Class A post-test in traditional way	6.95	1.986	4	10
Class B pre-test in motion graphic	3.50	1.581	1	6
Class B post-test in motion graphic	8.25	1.446	5	10

The results of above table show that there is not a significant difference between the mean of class A and class B scores in the pre-test. The color theory scores of two groups increased in the post-test.

The difference between the mean of color theory scores in the two groups are presented in the following graph in the pre-test and post-test.
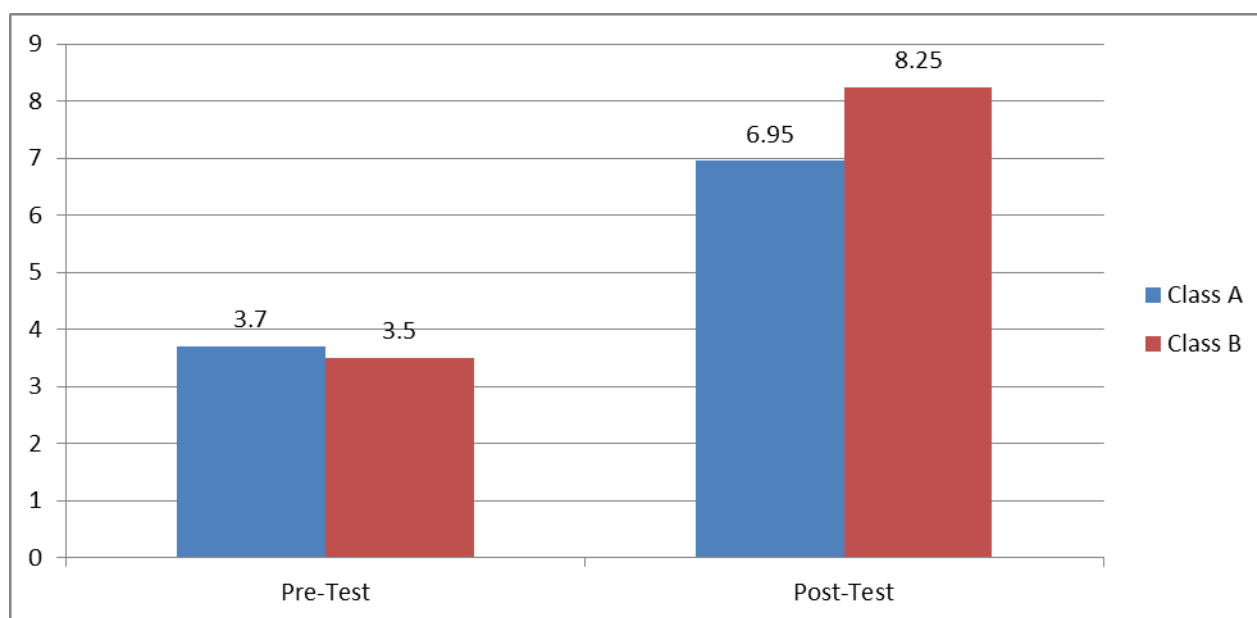

Figure 3. The summary of student grade charts.

The mean score for class A students before being taught in the traditional way and that for class B taught using motion graphic is the same.

Table 2. T-Test of student grad's pre-test.

	Levene Test		T - Test		
	F	Level of Significance	T	Degree of Freedom	p.value
Equal variance	0.046	0.083	0.0272	18	0.0789
Unequal variance			0.0272	17.902	0.0789

According to Levene test, the variances of two groups are equal and also as the level of significance is 0.789, so the mean of the two groups are the same.

The mean for class A students after being taught in the traditional way and class B taught usingn the motion graphic is the same.

Table 3. T-Test of student grad's post-test.

	Levene Test		T - Test		
	F	Level of Significance	T	Degree of Freedom	p.value
Equal variance	0.719	0.402	-2.051	37	0.047
Unequal variance			-2.063	35.888	0.046

According to Levene test, the variances of the two groups are equal and also as the level of significance is 0.047 so the mean of the two groups shows a significant difference.

Conclusions

Many surveys have been conducted for investigating the learning by the use of multimedia from different views. It can be observed that the potentials of motion graphic are known in nowadays digital era. Motion graphic has this potential to use sound, image, motion and story for conveying the contents and also can help designing new educational method and forming creativity in learning. In this study we selected two undergraduate student classes as a sample data, and we used traditional method in class A whereas multimedia methods in class B.

Before introducing color theory to the both classes the average score of students both were similar which inferred students had no pre knowledge regarding color theory. To proof this hypothesis the F-Test followed by t-test were applied, and the results are presented in Table 2. The p.value (0.0789) greater than 0.05 shows the difference between students' knowledge was not significant.

On the other hand, the p.value (= 0.047) smaller than alpha (= 0.05) shows students grades in class B, where taught showing the motion graphic, were significantly higher than class A where the color theory was introduces using traditional methods. The table 3 shows the post test results.

Recommendations for Future Research

- According to the results, it can be recommended that motion graphic teachers and designers, in designing and producing motion graphic, need to pay more attention to convey the lesson properly lesson and also universities should provide a suitable way for implementing new teaching methods for teachers because by designing good and logical motion graphic we generally can facilitate the learning process for students.

- One of the most important points is to create an educational motion graphic that addresses the age of the audience with the characters and the format of the motion graphic. In other words, the tone and visuals should target the same age audience. If it does not speak to them at their level of education, students who recognize that may choose not to listen. So, it could compound the results because they tune out due to feeling that they are being talked down to.

- It might be hard for old teachers to learn how to make motion graphics with new software. They can get help from graphic artists and animators. The senior teachers could explain the content of the lesson for motion graphics experts to create an educational motion graphic.

REFERENCES

1. Tinio, V.L. (2003). ICT in Education. UNDP-APDIP [On-line]. U.S. Department of Education. Use of Technology in Teaching and Learning. Retrieved on February 10, 2015. Available from http://www.ed.gov/oii-news/use-technology-teaching-and-learning

2. Phillips R, The developers handbook to interactive multimedia: A practical guide to for educational developers. London: Kogan Page; 1997. Available from: https://eric.ed.gov/?id=ED412931

3. Chioran A. 5 benefits of multimedia learning [Blog post]; 2016, November. Available from: https://www.nuiteq.com/company/blog/5-benefits-of-multimedia-learning

4. Jerinic L. Re: What is the best method for making students participate actively during teaching?; 2014. Available from: https://www.researchgate.net/post/What-is-the-best-method-for-making-students-participate-actively-during-teaching/530b93e8d3df3ed0588b4599/citation/download

5. Morrison JB, Tversky B, Betrancourt M. Animation: Does It Facilitate Learning? AAAI Technical Report SS-00-04; 2000. Available from: https://www.aaai.org/Papers/Symposia/Spring/2000/SS-00-04/SS00-04-009.pdf

6. Haque MA, Abu Raihan Md, Clement CK, Compare the Effectiveness of Digital Content Teaching and Traditional Teaching to Academic Achievement, International Journal of Education and Evaluation ISSN 2489-0073 Vol. 2 No.7 2016. Available from: https://iiardpub.org/get/IJEE/VOL.%202%20NO.%207%202016/COMPARE%20THE%20EFFECTIVENESS.pdf

7. LEOW FT, Interactive Multimedia Learning; Innovation Classroom Education in a Malaysian University; The Turkish Online Journal of Educational Technology – April 2014, volume 13 issue 2. Available from: https://files.eric.ed.gov/fulltext/EJ1022913.pdf

8. Kassim H, The relationship between learning styles, creative thinkingperformance and multimedia learning materials; The 9th International Conference on Cognitive Science, Published by Elsevier Ltd. Open access under CC BY-NC-ND license. Procedia - Social and Behavioral Sciences 97, 2013. 229 – 237. Available from: www.sciencedirect.com

9. Liao YKC, Effects of Hypermedia Versus Traditional Instruction on Students' Achievement, Journal of Research on Computing in Education, 1998. 30:4,341-359, Published online: 24 Feb 2014. Available from: https://doi.org/10.1080/08886504.1998.10782232

10. Sharma HL, Computer multimedia instruction versus traditional instruction: an experimental study; Article in International Journal of Scientific Research• February 2013. Available from: https://www.researchgate.net/publication/322977262

11. Lin MH, Chen HC, Liu KS, A Study of the Effects of Digital Learning on Learning Motivation and Learning Outcome; EURASIA Journal of Mathematics Science and Technology Education. ISSN: 1305-8223 (online) 1305-8215 (print) 2017 13(7):3553-3564. Available from: https://doi.org/10.12973/eurasia.2017.00744a

12. Waddell J, The Role of Technology in the Educational Process, Green & Write, Michigan State University; 2015. Available from: https://education.msu.edu/green-and-write/2015/the-role-of-technology-in-the-educational-process/

13. Aloraini SI, Distance learning; 2005. Alretha Press, Dammam, Kingdom of Saudi Arabia.from:https://scholar.google.com/scholar_lookup?title=Distance%20learning&publication_year=2005&author=Sara%20Ibrahim%20Aloraini

14. Hadmin D. The world of Multimedia; 2000. Available from:http://vml.hqadmin.doe.govAQMULTI.html

15. Zaitoun KAH. Educational Technology in the Age of Information and Communication. The world of books, Cairo; 2002.

16. Aloraini SI. The impact of using multimedia on students' academic achievement in the College of Educationat King Saud University. J King Saud Univ Languages Translation. 2012;24(2):75-82. Available from: https://www.sciencedirect.com/science/article/pii/S2210831912000033?via%3Dihub

17. Qandeel, ARY. Educational methods and technology education, First Printing. Publishing House, Riyadh; 1998. Available from:https://scholar.google.com/scholar?q=Qandeel,%20Abdul%20Rahman%20Yasin,%201998.%20Educational%20methods%20and%20technology%20education,%20First%20Printing,%20Publishing%20House,%20Riyadh

18. Holsinger E. How do multimedia works. First ed. Arab Scientific Publishers, Lebanon, Translation by Centre for Arabization; 1995.

19. Alfar I. Preparation and production of interactive multimedia software, second edition. Delta Computer Technology, Tanta, Egypt; 2009. Available from: https://www.coursehero.com/file/p23hp8f/Alfar-Ibrahim-2009-Preparation-and-production-of-interactive-multimedia/