Application of 3D Cartoon Animation to Thai Plays for Thai Youth: Case study of North Eastern Region of Thailand

Suwich Tirakoat and Siriwiwat Lata

Abstract—the Thais play games for enjoyment, to participate in competitions and also to improve their performance in their lives as well. Playing games are inherited through generations in Thailand. In the past, the experts used to teach how to play games to the youth by telling them in a story format. Nowadays, it is found that this culture of inheritance and the tradition of learning through Thais playing are getting lost. Animation cartoons are very popular media among the Thai youth. If we use the animation cartoon method as part of teaching, learning process, Thai youth will benefit and also will keep the culture and tradition of Thailand. The objective of this research is: to test the animation cartoon media to know the level of understanding, satisfaction and the perception levels of content by the students. The research instrument used in this research include: structured questionnaire, 3 dimension cartoon animation, to know the students' levels of perception and satisfaction. The research sample includes 70 primary school students from Roi-Et province. Statistical value used for testing are: means, standard deviation, t-test and F-test. The results revealed that the level of the satisfaction which the students gain was very good. The male and female students in all levels of class found to be significant with high level of satisfaction 0.05. The students found to be very good in the content perception testing that includes the male and female students as 0.05.

Index Terms— New media, Animation, Cartoons, 3D Cartoon animation, Thai stories, Thais' plays.

I. BACKGROUND AND MOTIVATION

Traditionally, Thais' Playing games [1,2] has been the daily activity among the children in the past. They were playing the games for fun using their free time apart from developing their skills and emotions with emphasis on the trick of relationship between players. The importance of the Thais plays: support the children's knowledge of observation, physical development, and support player's creativity [8]. With the beautiful colors and advantage of the plays, Thais' playing games became one of the Thai cultures and found to be unique. On the other hand, it is found that cultures around the world are quickly changing and interfering with their local culture. This is making the youth discard their own tradition of playing and by accepting the new one they forgot the old. This is the reason that Thai culture is slowly missing and may disappear in the future.

It is necessary to focus on this problem and explore possibilities of protecting the Thai culture and tradition using different methods. The method and form should focus on the present situations linking with the past. The creative and interesting media need to be used to attract the young children to learn Thai culture and tradition. The digital New Media is one such technology through which the children can be drawn with attractive animation with cartoons.

The Cartoon animation is part of new media to translate content to the audiences especially to the children. Most children like cartoon and animated cartoon because it makes them freedom of imaginations [3]. Further, using animation for transferring the content of Thai tradition of playing is the good way to preserve the Thai uniqueness.

II. RERATED ISSUES

Chailairat Rupchaiyarphum [8] studies to compare problem-solving ability score of young children (5-6 years) before and after engaged in Thai Folklore Play activities. The result of his research showed that the problem-solving ability of young children before and after engaging in Thai Folklore Play activities was significant and different.

Cartoons depict many interesting, funny and educative events to increase the imagination of the people. Cartoon is an image that is created from the imagination of artists for translating the emotion and feelings of lines and colors, as an indispensable instructional media for all levels of education. Skilled cartoon artist can transform the paint to storytelling, show events, and make audience perceive sound, smell, taste, touch and imagination [4, 9]. The qualification of cartoon is in the expression, thinking, imagination, sarcasm, as well as caricature.

Animation brings life to the cartoons and pictures. Animation [5] is sequences of still images or frames with changed speed called frame per second (fps.). Normally animation movie uses 12-24 fps. This rate will show acting of character like the real life. Then, when we use cartoon images to be the images in animation production, it is called as cartoon animation. The example of computer animation production tasks [10] is Pixar's Toy Story production pipeline as shown in Fig.1. *The Story* team translates the verbal into the visual. The screenplay enters the Story team, the storyboard is developed, and the story reel leaves. It goes to the Art team. *The Art* team, working from storyboard, creates the designs and color studies for the film, including detailed model descriptions and lighting scenarios. This guides the Modeling, Layout and Shading team.
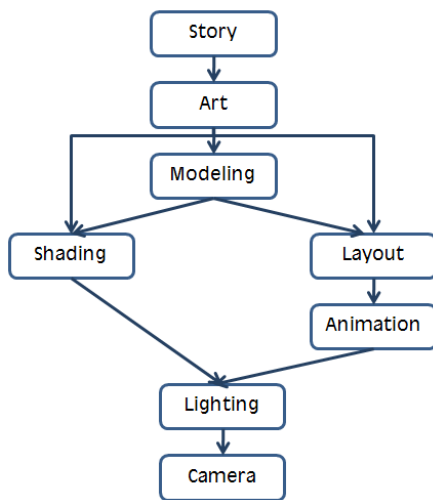
Figure 1.   Toy Story production pipeline.

The Modeling team creates the characters and models with inherent movements. This facilitates the ability of animators to stay on the model, ensuring the animation remains consistent with the concept of model. The models are given to Layout and Shading team. *The Layout* team is responsible for taking the film from 2D to 3D, and implements proper staging and blocking which guide the Animation team. *The Shading* team must translate the attributes of the object that relate to its visual appearance. *The Animation* team is responsible for bringing the characters to life, and creates the subtler gestures and movements necessary for carry out the scene. *The Lighting* team assigns to each sequence teams that have responsibility for translating the art's vision into digital reality. *The Camera* team is responsible for rendering the frames.

Many researchers use animation to support teaching, Glenn Smith and Eban Escott [6] use animation in teaching the general computing concepts course, the result showed the animation improve student motivation. Another field of using animation is visualization as Brenda J. Burkhart and Marc E. Fusco [7] use animation to aid process flow visualization, some processes are difficult to communicate to customers which are complex or involve multiple systems. This research exposes the viewers' expression, immense satisfaction with the ability of animation to communicate complex process flow and hard-to-visualized material effectively.

III.   RESEARCH METHODOLOGY

A.   The Objectives

This research has 2 objectives:
- to design and develop the 3D cartoon animation with content containing details of story of Traditional Thai Playing
- to study and compare the levels of satisfaction and content perception of students who are different in sex and age

B.   Research Hypothesis

The result of designing and developing 3D cartoon animation (called Thai playing cartoon) makes the youth, who are both different in sex and age, gain the same level of satisfaction and content perception.

C.   Research Processes

The steps of research work is detailed in the following diagram in Fig. 2 consisting of 5 steps

1) *Study and Analysis:* This step is to study the content of Tradition of Thai Playing and animation development processes. For analysis process, select the type of Thai playing to create story in the animation development.

2) *Design the research instruments:* This research uses two types of tools including: 3D cartoon animation and questionnaire.

3) *Cartoon animation production:* This process starts with the art of creating cartoon characters and content design, using storyboard, to be the movie director. Then follows cartoon modeling, texturing and animating. After rendering both moving characters and senses, making sequences of still images edited by digital video production software, result in to a final cartoon animation.

4) *Hypothesis Test with samples:* The samples were 70 students who are studying in grade 1-3 of primary school at Roi-Et province located North Eastern Region of Thailand. Testing starts by showing all of the animation, then let's students to play like as shown in the animation. After that is the collection of data from the students by filling the questionnaires.

5) *Report the results of research:* Data analysis for hypothesis testing, use means, S.D., t-test and F-test values result in writing the report as the final process.

Figure 2.   The 5 steps of research process.

IV.   THE RESULTS

Following the research process steps, this will illustrate the

results of the research work.

A. Storytelling and Animation designing:

1) Storytelling: The story of developing animation is Traditional Thai Playing, shows how to play right to the closest with the past. The story telling emphasizes the design beautiful and funny. The type of play which is created in animation form has 3 plays, called in Thai: *Ree-ree-kwow-saan*, *Chon-haa* (hiding and finding) and *Mon-chon-phaa*. In this topic, we want to show the details of how to playing the game of *Ree-ree-kwow-saan*, after that we show the example of storytelling and animation design is shown in Fig 4.

The playing rules of Ree-ree-kwow-saan, the detail are stated below:

Ree-ree-kwow-saan game, it can be played with unlimited number of players. The first step is selecting 2 players who stood out hands above their head as the gateway. Each other is standing in the line and hold other's waist. Next, the two members of the gateway start singing. The row will go under the arch. At the end of song, gateway closes and blocks the last player caught. The player is caught must leave the game. The game starts again and again, the last player who isn't caught, is the winner.

The song of Ree-ree-kwow-saan, the detail are stated below:

"Ree ree kwow saan song khan an kwow piak
Dek noi ta lueak lueak thong bai lan
Khot kwow sai jan khoi phan ou khon khang lang wai"

Figure 3. Ree-ree-kwow-saan game.

The group of children wants to play "Ree-ree-kwow-saan" which is Thai traditional playing, but they don't know how to play. Then they ask the old man to describe them as how to play, rules and singing the song of the plays. After that all the children play the game, they start singing the play's song and enjoyed fun. But Jon, the fat boy who is refractory, breaks the rule; finally he gets in to the accident and cries. Then the old man teaches them about the right way to play and the value of play.

Figure 4. Ree-ree-kwow-saan storytelling.

2) Character Design: For all cartoon character designs and details see the table I., where we designed the emotion as shown in Fig. 5. In our cartoon animation, there are 6 cartoons designed to play in the animation as shown in Fig. 6 consisting of 3 boys, 2 girls, and an old man who will explain the methods of playing to children.

TABLE I.   CHARACTERS DESIGN

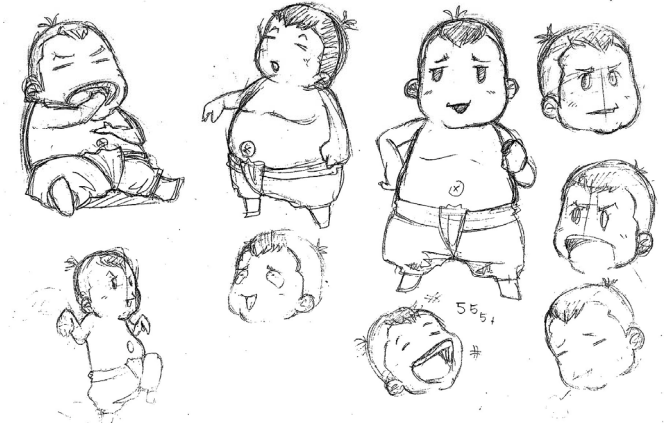| Name	Cartoons	
	Sex	Characters
Jon	Male	A fat boy, cheat, playful and funny, like to beat
Khae	Male	A smallest boy, thinks quickly and works, weak, coward
Juk	Male	Intelligent, courageous and mellowed
Chabaa	Female	Cheerful, frank, skeptical
Chumpaa	Female	Nice and chatter
Taa Thong	Male	Kind, rational with experience

Figure 5. Jon's emotion design.

Figure 6. Character design.

3) Storyboarding: This process is translation of telling the story in pictures with scenes, characters acting, camera views, and sequence of the story. Some pictures on the storyboard show direction of cartoon and the duration. Fig. 7 shows the storyboard of some scenes of *Ree-ree-kwow-saan*.

4) 3D Modeling: The 3D graphics software makes the designed cartoons in 3 dimensions. The result of this process is the 3D characters acting and dressing like real world, shown in Fig. 8.
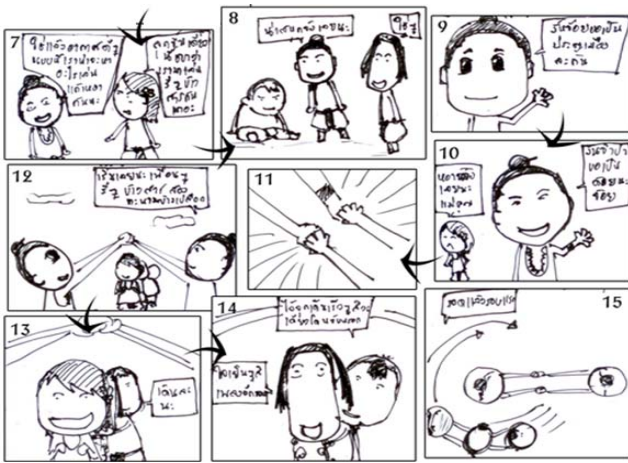
Figure 7.   Storyboard for Ree-ree-kwow-saan.

Figure 8.   3D characters.

B. The questionnaire design

This research uses 2 questionnaires for data collection. These are satisfaction and content perception questionnaires.

1) *Satisfaction questionnaire:* To ask students about how much they like the character design and story of animation. The way to answer the questions is to make any sign over the smile picture (☺).

2) *Content perception questionnaire:* This questionnaire's objective is for testing the students' knowledge and understanding about Thai playing, after watching the animation and participating in playing by acting as shown in the animation. Rules for playing are necessary to clearly understand. The way for answering the question is make any sign over the smile picture (★).

Both questionnaires use a standard five point scale. This corresponds to a scale of 1-5, with 1 being lowest agree, and 5 being highest agree. The students, whose age is 7-8 year old, the number of scales is represented by picture. The example of questionnaire is shown in Fig. 9.

Figure 9.   The example of questionnaire.

C. Data collection

The data collection consist of 3 activities: showing all of the animation to students, leading them to play the game like shown animation, and finally asking them the questions.

D. The final animation

The samples are shown in figure 10.

Figure 10. The final animation.

E. The results of study

This section presents the results of data analysis and hypothesis testing.

1) *The results of satisfaction test:* the overall level of satisfaction is high ($\overline{X}$ =3.82, S.D.=0.43). Determining each of the lists, the students are more satisfied of 2 questions: *like the images in animation* ($\overline{X}$ =4.67, S.D.=0.63) and *understanding the content* ($\overline{X}$ =4.60, S.D.=0.79). Conversely, response to the opposite question: *don't like this animation* ($\overline{X}$ =1.49, S.D.=0.91) and *feel sleepy* ($\overline{X}$ =1.61, S.D.=1.11). The details are shown in table II.

TABLE II.   SATISFACTION LEVEL

Question List	Statistics Value and Meaning		
	$\overline{X}$	S.D.	Satisfaction Level
Like animation's images	4.67	0.68	Most
Like animation's audio	4.36	0.90	More
Away watch the show	4.06	1.13	More
Gain knowledge from animation	4.44	1.00	More
Feel sleepy (opposition question)	1.61	1.11	less
Don't like this animation (opposition question)	1.49	0.91	Least
Laugh when cartoon acts joke	4.24	1.15	More
Excite while watching	4.24	1.13	More
Understand content of animation	4.60	0.79	Most
Need to watch again	4.47	0.94	More
Overall	3.82	0.43	More

2) *The results of satisfaction levels of hypothesis tests with difference in sex and grade:* level of signification at 0.05, the result exposed that student who were different, both in sex (t=-0.079, Sig.=0.938) and level of grade (F=1.287, Sig.=0.283) have the same level of satisfaction. The details are shown in table III.

TABLE III.   STUDENT'S SATISFACTION HYPOTHESIS TESTS

Student Items	Statistics Value				Sig.
	n	$\overline{X}$	d.f.	t/F	
Sex					
Male	28	3.81	-	t= -0.079	0.938
Female	42	3.82			
Grade Level					
Grade 1	23	3.73			
Grade 2	25	3.92	2	F=1.287	0.283
Grade 3	22	3.78			

3) *The results of content perception test:* the overall level of content perception which student gained from the animation is more at perception level ($\overline{X}$=4.46, S.D.=0.58). Determining each of lists, the students are more satisfied to know and understand 2 questions: *known the name of playing* ($\overline{X}$=4.67, S.D.=0.72) and *student can sign the playing songs* ($\overline{X}$=67, S.D.=0.65). The details are shown in table IV.

TABLE IV.   CONTENT PERCEPTION LEVEL

Question List	Statistics Value and Meaning		
	$\overline{X}$	S.D.	Perception Level
Know the name of playing	4.67	0.72	Most
Understand playing methods	4.17	1.00	More
Sing the playing songs	4.67	0.65	Most
Know the rules of playing	4.36	0.96	More
Know the playing equipements	4.46	0.88	More
Overall	4.46	0.58	More

4) *The results of content perception hypothesis tests with difference in sex and grade:* hypothesis test at level of signification is 0.05, the result exposed that students who were different both in sex (t=-0.07968, Sig.=0.946) and level of grade (F=0.190, Sig.=0.823) gained the understanding and knowledge about Thai playing in the same level. The details are shown in table V.

TABLE V.   STUDENT'S PERCEPTION HYPOTHESIS TESTS

Student Items	Statistics Value				Sig.
	n	$\overline{X}$	d.f.	t/F	
Sex					
Male	28	4.46	-	t= -0.068	0.946
Female	42	4.47			
Grade Level					
Grade 1	23	4.49			
Grade 2	25	4.50	2	F=0.190	0.828
Grade 3	22	4.40			

V. CONCLUSION AND DISCUSSION

The research has the main objectives to design and develop 3D animation which contained content about Thai playing and to study the results of the test with the students. This section shows the details of summary and discussion.

A. Animation

For this research, we designed cartoon and storytelling based on nice characters, attractive to children and in Thai style. The results of 3 stories show detail of 3D playing.

B. Studying Result

This research exposed both different in sex and in age of students, had same level of satisfaction and content perception level at statistically significant level of 0.05.

C. Discussion

The children like cartoon animation. Using cartoon animation is the best way to represent the social information, support teaching, and simulation, consist to many researches [4, 6, 7].

The video and computer games are important since they benefit in many ways for the children or players, such as increase the player's skill and imagination, teach player some basic skill in enjoyment, acquires very complex skills with the help of computer games, simulates education [11]. Further, Thai playing is funny activity; we simulate it into a computer or video game with rich instructiveness and make more attractive and interesting to the users.

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