A Case Study of Short Animation Production Using Third Party Program in University Animation Curriculum

Choi, Chul Young

Professor, Major of Animation and Visual Effects, Dongseo University, Korea
freechoi@dongseo.ac.kr

Abstract

The development of CG technology throughout the 2000s brought about a significant growth in the animation market. This phenomenon led to an increase in the number of people required by related industries, which led to an increase in the number of related majors in universities. CG application technologies are becoming more common with the advent of YouTube and virtual YouTubers, but high technology is still required for students to get a job. This situation is not easy to include both technological and creative skills in the college animation curriculum. In order to increase students' creativity, we need a lot of production experience, which requires a lot of knowledge and time if we only use tools like Maya and 3D Max. In this paper, We tried to devote more time to storytelling by minimizing the technical process required for production and proceeding with repetitive or difficult processes for content creation using third-party programs. And through the 12-week class, the experimental production process was applied to the process from planning to completion of animation works that students would submit to the advertisement contest.

1. Introduction

In Korea, an animation-related major was established at Sejong University in 1996 for the first time in the department of animation. Starting with this, many universities began to major in commercial applied art, not pure art. Currently, 52 universities in 4-year universities have related majors, and 20 universities in 2-year universities have related majors [1]. Looking at the employment rates for August 2016 graduates and February 2017 graduates, four-year colleges show 61% and two-year colleges 60%. According to the 2017 Worknet data, it shows the occupational groups belonging to companies such as planners, producers, and video graphic designers. And if you look at the recent occupational groups, the number of small studios or freelancers is gradually increasing. Recently, the popularity of professional groups such as YouTubers or virtual YouTubers is increasing [2]. The characteristic of this job group is that it produces many videos quickly with a small number of people and uploads them online to generate profits. These occupations led to

the creation of tools that can easily edit videos, such as 'OBS Studio', and virtual characters, such as 'Vroid', that can be easily created and applied to YouTube. Although existing 3D tools insisted on high prices, the phenomenon of providing free tools such as 'OBS studios' and 'Vroid' suggests that the value of the final product is more important than the value of the software production process. The characteristic of popular YouTubers and virtual YouTubers is that Computer Graphics(CG) technology will support them, but the important thing is that they create content with more creative and fun ideas than others. This situation means that animation education in universities should put more emphasis on creation than on technology. However, in reality, many parts of the college animation curriculum are still assigned to function-oriented, and the technical aspect is emphasized. Because the quality of commercial results is constantly being expressed in hyper-realistic ways, students still need to receive skill-oriented education to produce hyper-realistic images. According to the School of Film/Video dept. of Calarts (California Institute of the Arts) in California, animation major is divided into character animation and experimental animation. The major itself is divided into skill-oriented and creative-oriented, so you can see how important these concerns are. The Experimental Animation Program offers a framework in which students explore, develop and refine intellectually demanding, aesthetically progressive concepts and professional practices in their personal cinematic art-making [3]. In order for students to experience a lot of creative activities within the existing curriculum, the production process should be made simple. It would be nice to be able to create a process that minimizes production in the main production tool, but the current situation is that many main tools are competing by adding complex and difficult functions. In this situation, I try to simplify the production process by using third-party programs that easily help with blendshape, rigging, and animating.

Figure 1 shows why many tools are not compatible with each other. A tool called 'Vroid' that can create virtual characters has a format called 'vrm'. A tool called 'MikuMikuDance(MMD)' that shows dance has a format called 'pmd' or 'pmx' for characters, a format called 'vmd' for dance moves, and a format called 'vpd' for character poses. A tool called 'Mixamo' has both rigging data and motion data in 'fbx' format. For these formats, 'maya', which is mainly used, is not recognized except for the 'fbx' format. So, the data of 'Vroid' or 'MMD' must be created in 'fbx' format through 'Blender' or 'Unity' tool, and then the data must be transferred to 'Maya'. Due to the incompatibility of the data format, there is an inconvenience of having to go through a blender or game engine tool, but I would like to apply it because it has the advantage of shortening the production period much more than producing all data in 'Maya'.
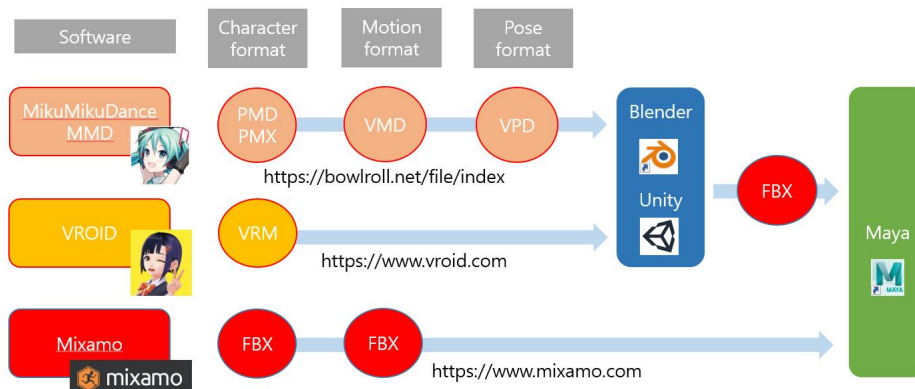

Figure 1. Examples of different data formats

2. Experiments

Third party program was used in 5 processes for short animation as shown in Table 1. This process will shorten the blend shape production and rigging production process time during the modeling process. In

addition, it can help the creator to spend more time on planning and post-production by shortening the rigging and animating time for character animation.
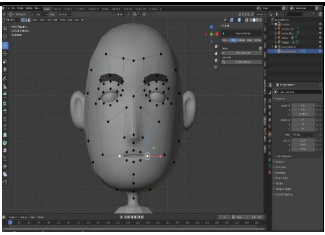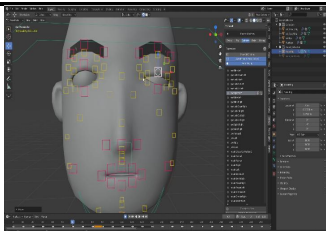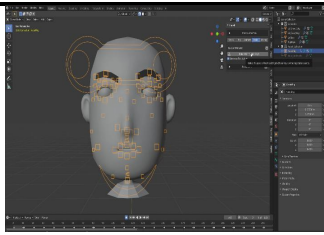
Table 1. Third party program applied to animation production

Process	Third party program	Main for third party program
Blendshape	Face it	Blender
Facial Capture	iFacialMocap	Maya
Rigging	Mixamo	Web site online
Motion Data Output	Mixamo	Web site online
Rendering	MNPRX	Maya

2.1 Modeling Process Proposal

CG modeling work is largely divided into character modeling and background modeling. In addition, character modeling can be divided into body and face blend shape work. Since animation generally has its own concept design for each work, it is important to make the entire body even if it takes time. However, since the process of creating a blend shape for the face is a repetitive task and takes a lot of time, it is better to automate the process if possible. Recently, a blendshape standard for real-time facial capture for mobile has been created, and third-party programs that automatically create it are being developed. The 'Face it' software, an add-on program used in the 'Blender' software, has a very simple process compared to the blendshape creation program used in the 'Unity' engine and is compatible with the 'Maya' program, so 'face it' is included in the blendshape production process did it. As shown in Table 2, exaggerated face modeling makes blendshapes easy and simple, and additional modifications are possible. Blendshapes created in 'Blender' software can be imported into 'Maya' programs in 'fbx' format. In 'Maya' programs, you can immediately apply facial animations using the shape editor window. Because the basic structure of blendshape is for real-time facial capture using mobile, you can create facial captures in real time using an app called 'iFacialMocap' in 'Maya'. In the case of background modeling, it is recommended to create results by using or applying pre-made data such as game asset stores rather than creating data.
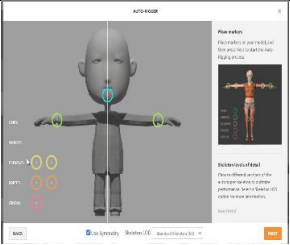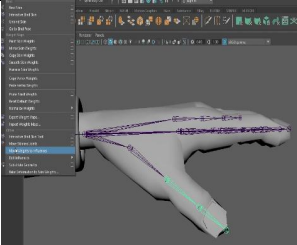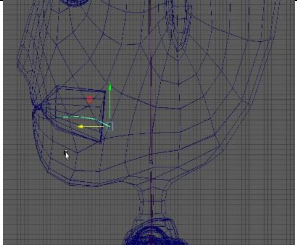
Table 2. Blendshape creation process of 'Face it'

face frame matching	Automatic creation of blend shapes	Customization of the shape

At the Blender Conference 2018, Andrew Price presented A.I. In the mention of the 3D industry to be changed, he said, 'The production methods of assets that are newly created every time are becoming very easy and fast to produce new assets at low cost through simple transformation through a modular production method' [4]. In the future, it is said that an environment will be created in which modeling data in a general form can be easily transformed into a procedure-making method and used in the form of a new required module [5].

2.2 Rigging Process Proposal

Character rigging is one of the most difficult processes. On the other hand, there are many automation tools that help with rigging. Which automatic tooling will be used can be divided according to the type of animation required for the work. It depends mainly on keyframe animation and motion data application. If you want to use animation data compatible with different characters or use motion data, using 'Maya''s human IK(HIK) control is convenient for applying and editing motion data. To connect rigging data to the HIK window, the simpler the rigging data you have, the better, but in this case, it is recommended to apply joint and skinning to modeling data using a tool called 'Mixamo' provided by Abode 'Mixamo' automatically rigs the modeling character we created very simply. By importing the rigged character into 'Maya' in 'fbx' format, the joint that needs to be repositioned can be moved and modified immediately after being skinned by using the 'move skinned Joint' function as shown in the figure in the table 3. In addition, since skinning is not required for joints for expression of movement of teeth and tongue, they can be created and added immediately. For eye movement, you can easily complete the final rigging by making a handle for eye movement using a locator and aim constraint. The reason I recommend 'Mixamo''s auto rigging function is that it is easy to modify and applies HIK control well because it is a simple rig consisting of only joints.
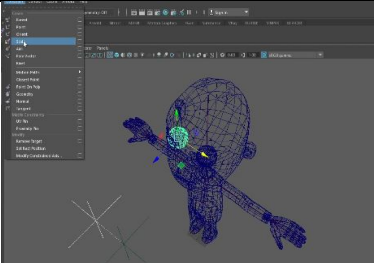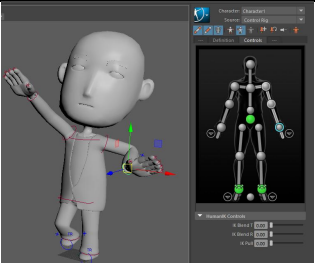
Table 3. (left) Rigging using 'Mixamo', (right) modifying and adding joints in 'Maya'

Automatic creation of character rig	Joint Position Correction	Apply additional joints

2.3 Animating Process Proposal

'Maya''s HIK control rig was used to use keyframe animation and animation using motion data together. As long as the storyboard has the correct character poses, most of the shots are easily accessible with just keyframe animation. It is effective to use motion data for full-shot actions such as walking, running, or jumping [6].

Table 4. Character rigging and editing motion data

Rig additional items	Apply HIK Controller to Body	Edit Motion with Time Editor

In the case of motion data provided online, since most of the motions are short-cycled motions, in order to make the necessary motions in situation, it is necessary to attach and cut the data, adjust the timing, and

change the position. As motion data provided by 'Mixamo' is increasing, it will be easier to find and apply desired motion data and use it, which is expected that this method of animation production will become common quickly. Creating new motions by applying motion data can be easily produced using 'Maya''s Time Editor window. Modifying motion clips in a layered manner as shown in the figure is similar to editing in adobe's 'After Effect(AE)', so even beginners can easily modify motion data [7].

2.4 Rendering Process Proposal

The best alternative to reducing rendering time is the use of real-time rendering technology. First of all, I can suggest a method to implement real-time rendering by transferring animation data to game engine software. In this case, Time for additional training on engine software is required. Second, as a solution within 'Maya' software, real-time rendering can be done using 'Maya Non-photorealistic Rendering Framework (MNPR)', a non-photorealistic rendering technique. The downside is that it's a NPR technique. The third is to use toon shading, which requires minimal rendering time. There is an additional advantage of using 'MNPR'. As shown in Table 5, the expression of paper texture makes even a simple background look uncomplicated. In addition, the sense of depth that brings out the feeling of watercolor can be done very lightly because there is no need to arrange a distant background. And because you work while looking at the real-time rendered image, it is easy to predict the result.
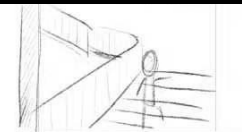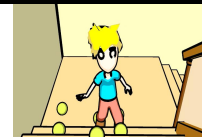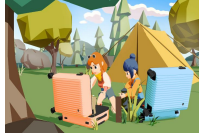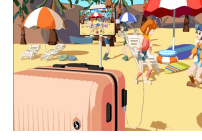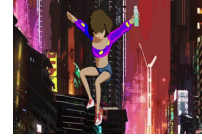
Table 5. Real-time rendering output with 'MNPR'

Ep1. 'Yes Professor'	Ep2. 'Shy JS'	Ep3. 'She is not There'	Ep4. 'Bus Story'

3. Applying the Proposed Process to the class

In the first semester of 2021, I tried it through an animation production class in the 3rd year of China-Korea Institute of New Media. The students conducted an advertisement project with the goal of submitting the contest in June. 60% of the students did the project with 2D animation, and 40% of the students did the project with CG animation. Students made the results by applying the proposed process of the main text to 3 projects of 13 students who worked on CG. The story of each team conducted by the students was about product advertisement and the length of the work was about 30 seconds. All motion data necessary for team work, except for keyframe animation, were obtained from 'Mixamo' and applied. Out of a total of 12 weeks of lectures, project planning and storyboarding took place for 3 weeks, and the actual production took place from 4 to 11 weeks for 7 weeks. In the last 12 weeks, the work was evaluated. For 7 weeks, as shown in the figure in the table, the students performed all of the character modeling, lighting, and rendering using the rigging animation toon shading, according to the storyboard, without any setbacks. The story changed during the three weeks of planning, but the animation was carried out as planned for the seven weeks of actual production.

Table 6. Student works with third party programs applied

	Storyboard	Output Images			Thrd party prog.
Team 1					'Face it' 'Mixamo' AutoRig 'Mixamo' Motion
Team 2					'Face it' 'Mixamo' AutoRig 'Mixamo' Motion 'Anold' toon Rendering
Team 3					'Face it ' 'Mixamo' AutoRig 'Mixamo' Motion 'Anold' toon Rendering

3. Conclusion

In this article, in order to reduce the limitations and time of animation production education using 'Maya' software, which is generally used in college animation majors, third party programs and open-software were used to allow students to create advertisement video contents within 12 weeks of lectures. As a result, unlike existing classes, students were able to think more about storytelling than character movement or modeling, and team2 and team3 had the honor of winning awards at the 2021 Chinese University Student Advertising Festival. These results can motivate students to be passionate about making art work. In fact, open source and third-party programs change and become new so quickly that it is not easy to apply in the classroom. However, its effective use is thought to be a positive help in animation education and provide a direction for improvement in lecture content.

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