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## **An animated textbook of creative stories of pitta nympha integrated with filial piety and gratitude**

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**Abstract.** Meaningful animated stories can bring readers the correct values, enhance their knowledge, and have the correct guiding role of social moral feelings. Pitta nympha, a rare and attractive protected bird, was used as the theme in this study, and animation software was used to draw the characters and plot effects. This study created a textbook for animation technology courses and provided it to schools as a textbook for homeland and natural education, which has been recognized by teachers and students. The results show that animated education can strengthen students' cognition of animal conservation and guide students to think about the importance of animal conservation, thus, inducing their behaviors of animal conservation. Moreover, animations can enrich students' knowledge structure and stimulate emotions, including filial piety and gratitude. Guiding the development of the true, the good, and the beautiful, the contents of this multi-culture media presentation can also be printed as paper-based picture textbooks for educational purposes.

**Keywords.** animation; sympathy; e-Learning; multi-culture and media; pitta nympha

### **1. Introduction**

Meaningful digital animation content can provide correct values [1] and social moral knowledge to readers, and portray a correct guiding role. The quality of animation plays a very important role in the psychological development of viewers [2]. The simulacrum feature of animation gives it the illusion of surrealism, but the contents should reflect real culture and life. In addition, the plot and aesthetic feeling of the picture designs are important elements in animation design [3]. In order to show the uniqueness and importance of the characters, it is necessary to touch the audience through general, simple, and understandable expressions of humanity, which will generate empathy only when having one's own understanding of the story [4], thus, the process of achieving empathy is reflected by truly integrating into the plot. That animation is a kind of human fashion art, an organic comprehensive art of painting skills and film and television art, and even more an important carrier of cultural communication. In animated teaching, teachers need to know the specific condition of students, in order to flexibly apply various teaching methods [5]. Better teaching effect can be achieved by effectively integrating various knowledge points in various vivid special examples.

## **2. Motivation and purpose**

Animation can captivate people's hearts, attract their attention, and promote learning [6-7]. As an artistic style with independent aesthetic significance, animation has been endowed with a lot of emotional thoughts. Meaningful animations can make viewers feel fun in the process of watching and subtly affect their cognition and change regarding the world, life, and values. Students may imitate the words and deeds in the animations to learn the code of conduct and the basic knowledge. However, most students like watching animations because animated short films have their own story content and structure, and create emotional stimulation, which allows the audience to be deeply immersed in the narrative arrangement of the story and be impressed by it [8]. Thus, the purposes of this study are: (1) Develop multi-cultural and media animation technology, which is provided for technical teaching purposes. (2) Combine the colorful pitta nympha with a story of filial piety and animate them into a digital textbook. Not only can the story of filial piety be viewed for entertainment, but the pitta nympha, one of the animated characters, can be better known, in order to cultivate the literacy of relevant conservation cognition and attitude, and achieve the effect of learning transfer.

## **3. Literature review**

Compelling stories can arouse viewers' empathy and make them empathize with the characters in stories [9]. Empathy consists of three processes, cognition, emotion, and motivation. In particular, cognition refers to the ability to identify the emotional state of others, after which the individual will have an emotional response, while motivation involves the process of behavior response triggered by empathy [10]. The key to the profound impact of storytelling is that the stories convey meaning and stimulate the viewers' emotions [11], which makes it easy to move beyond the real world and experience the stories and life experiences of the characters.

If a short animated story film can create situational integration that deeply involves viewers in the emotional mode of the narrative arrangement of the story, such as filial piety, taking care of their mothers, and expressing the feelings of the characters, viewers can empathize with the characters, and then, be sympathetic to the animation. A good story can stimulate emotional creation, immerse the audience in the story, and leave lasting charm. The story is the soul of short animated film writing; therefore, story-based short animated films can imperceptibly bring visual memories, which are both thought-provoking and easily impressed on people.

### *3.1. Animated textbook*

Images can convey many verbal concepts and even replace or contain non-verbal narratives. Through visual presentation, concepts that cannot be expressed by words can be better understood [12]. The animation development of stories can improve the degree of interest and immersion in a narrative [13]. In the digital era, many storybooks are gradually produced into animated films, thus, the digital learning environment and the application of new technology are bound to become trends. Digital animation is also a kind of multimedia for teaching, as it is easy to store, transmit, and play on the Internet [14], and has a positive effect on enhancing e-learning. This study aimed at stimulating emotion and creating filial piety and gratitude through an animated story textbook for educational purposes. In addition, this animated story can help make students aware of and understand a rare creature, the pitta nympha.

### 3.2. *The significance brought by animated education*

Cheng and Chiu [15] produced animations regarding mosquito ecology and dengue fever prevention, which were presented as diversified teaching aids to attract students' attention and interest, in order to further generate learning behaviors. In terms of expressing abstract concepts through animation, the animated story was convenient for teachers to teach, and students learned the mosquito ecology and harm brought by them in a simple and clear manner, which provided students with a better understanding of epidemic prevention. Ecological animation for the red fire ant was produced [16], including teaching aids, in order to attract students' attention with the unique visual style, and the interesting nature of the story aroused the students' interest and learning behavior.

Through multi-cultural media animations and teachers' explanations in class, students could learn about filial piety by observing rare birds, which attracted their attention and generated their interest.

### 3.3. *Animal conservation*

In his book, *The Diversity of Life*, Edward Osborne Wilson [17] mentioned: "Every country has wealth in multiple forms: Material wealth, cultural wealth, and biological wealth", among which biological wealth refers to the biological resources accumulated in the natural environment of a country. Humans are breaking through ecological limits at breakneck speed. When people work hard for material wealth every day, intangible consumption and accumulation will cause large-scale environmental impact and the loss of biodiversity [18-19], which will eventually lead to ecological imbalance [20], and humans will be the last victims. If humans can pay more attention to the use and consumption of resources and the impact of activities on earth [21], they can ensure the continuity of cultural wealth and the preservation of biological wealth in the natural environment, while pursuing material wealth.

In the low-altitude forest areas of Taiwan, where the forest coverage is high and the environment is humid, it is possible to see the pitta nympha in summer [22]. In the "Red List Categories of Birds in Taiwan", Lin et al. [23] mentioned that the number of breeding population of the pitta nympha in low-altitude areas has declined in recent years, which aroused the motivation of this study to make animated stories with the pitta nympha as the theme.

Learning from the objects in the living environment is one of the important goals of science, and everyone should learn from nature [24]. This study utilized the power of technology to bring children into [A Bug's World] and explore their characteristics, ecological development, and living habits. It is expected that it can be a [fun] and effective learning pattern to study biological science without burden, and where happiness can be created.

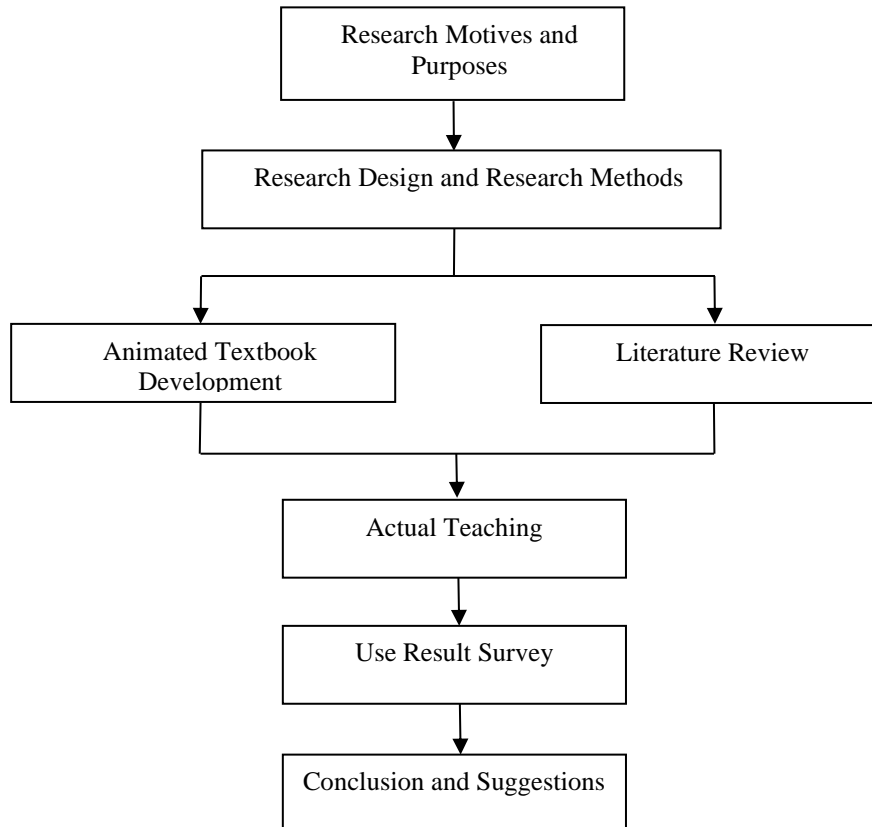
Consequently, provided the animated content can attract viewers' attention, enhance their cognition of ecology and animal conservation, and achieve educational purposes, it can become educational material for conservation.

A survey on tourists in nature reserves found that tourists with better environmental literacy and attitude would exhibit better conservation behaviors [25]. Tourists who were more aware of the concepts of ecology and animal conservation were more likely to express these concepts in their external behaviors. Chang and Lin [26] established precious bird films taken by Mr. Liu Yanming, an ecological photographer, as an online video and audio database for the public to browse and watch, in order that the public could have more knowledge of birds by providing more ecological photos. Through such measures, the public's cognition of domestic ecological conservation can be improved and educational promotion can be assisted. Therefore, in addition to the development of multi-cultural and media technologies, this study also

introduces a special bird, the pitta nympha, in the animation, and hopes to guide viewers to care more about this rare ecological species.

#### 4. Research method

The flow chart of the research steps is illustrated in Figure 1:














**Figure 1.** Flow chart of research steps.







Every summer, the pitta nympha makes a long journey from Southeast Asia to Taiwan. Due to its gorgeous appearance, mysterious whereabouts, and unique charm, bird watchers in Taiwan and other Asian countries are deeply attracted to the arrival of the pitta nympha.

One of the soul-shaping tasks in animation is character design. Animated characters are vitalized by creators, and only such characters can interpret the touching and often tortuous plots, as well as attract audiences. As a result, the charming features of the pitta nympha, with its eight colors, became one of the characters produced in this study. The animations of the creative story script for the pitta nympha were captured from the pictures on the online video and audio database to produce various storyboards, which are organized in Table 1.

**Table 1.** Paragraph styles.

Storyboard	Script	Animation captured pictures
Storyboard 1	Man C and his mother depended on each other for survival. In order to cure his mother's fading eyesight, Man C carried his mother around looking for famous doctors (the mother and son moving down the mountain)...	
Storyboard 2	A famous doctor told Man C that it was necessary to take the tears of the pitta nympa and make eye medicine with herbs to cure the mother's eyes...	
Storyboard 3	Even though Man C was a hunter, he had never seen a pitta nympa. He imagined what it looked like...	
Storyboard 4	Rain or shine (dynamic situation effect of overcast and rainy days), Man C climbed over the hills looking for traces of the pitta nympa...	
Storyboard 5	Seeing an eagle chasing a bird (the dynamic effect of a flying eagle flapping its wings), Man C chased the eagle away...	

		 <p>老鷹嚇了一跳，被抓住的小鳥也就逃離老鷹的腳爪。</p>
Storyboard 6	The bird was so grateful that it presented Man C with its favorite food, “bugs”, to express its gratitude (two bugs were writhing).	 <p>小鳥為了表示對小毛的感激，就唧著就最愛吃的蚯蚓給獵人。 小毛笑著對小鳥說：「謝謝你的食物，你還是自己吃吧！」 為了報答小毛的救命之恩，小鳥就跟著他去採八色鳥。</p>
Storyboard 7	Man C was very happy to see the bird’s colorful plumage. He counted, but there were only seven colors on the bird’s body, not eight. He was so disappointed...	 <p>小毛數著「1、2、3、4、5、6、7」。 「居然有七種顏色，好漂亮的小鳥啊！」 可是，小毛仍舊眉頭深鎖著。</p>
Storyboard 8	Man C continuously climbed over the hills to look for traces of the pitta nympha. Once, he saw a colorful feather in the grass in front of him. He thought it was a pitta nympha and wanted to catch it...	 <p>有一次，小毛在森林中發現了鮮豔的羽毛，便舉起彈弓射擊。</p>
Storyboard 9	Man C caught the colorful feather, but heard a wailing. It turned out that the colorful feather was a hair ornament worn on the head of the aboriginal people...	 <p>有一次，小毛在森林中發現了鮮豔的羽毛，便舉起彈弓射擊。</p>
Storyboard 10	Enraged by the pain, the attacked aborigine picked up a stone from the ground and tried to throw it at Man C (the flying stone grew bigger gradually from a distance)...	 <p>莫名其妙被石頭擊中的原住民非常生氣，就順手撿起一顆更大的石頭，朝小毛丟去。</p>

<p>Storyboard 11</p>	<p>In order to repay his kindness, the bird flew in front of Man C and stopped the stone that was about to hit him, landing injured...</p>	 <p>小鳥倒在血泊之中，小毛看著為了自己受傷的小鳥，難過地哭了起來。</p>
<p>Storyboard 12</p>	<p>Man C quickly picked up the injured bird with both hands, applied medicine to the wound, and wrapped gauze around the wound...</p>	 <p>經過小毛的細心照顧以後，小鳥兒終於痊癒了。</p>
<p>Storyboard 13</p>	<p>A few days later, Man C unwrapped the gauze on the bird and saw that the wound had healed. Thus, he also found that the bird's abdomen had a deeper red color (the abdomen of a real pitta nympha is red). He was greatly surprised that it was a pitta nympha...</p>	 <p>肚子上卻多了一塊鮮紅色印記 小毛驚喜的數著牠身上的顏色：「1、2、3、4、5、6、7、8...」</p>
<p>Storyboard 14</p>	<p>Man C was elated (dancing)...</p>	 <p>「哇！原來，妳就是八色鳥...」。</p>
<p>Storyboard 15</p>	<p>Man C found that the pitta nympha was also moved to shed tears of joy and gratitude (blue tears fell from above), and he caught the pitta nympha's tears to make eye medicine. The eyes of Man C's mother recovered...</p>	 <p>八色鳥感染了他們的喜悅，流下了最珍貴的彩色淚水。</p>
<p>Storyboard 16</p>	<p>The pitta nympha spent the winter at Man C's home. When spring came, it said goodbye to Man C and flew back to its habitat (spreading its wings farther and farther, while getting smaller and smaller visually).</p>	 <p>就這樣，孝順的小毛順利地治好了母親的眼疾。八色鳥也告別了小毛，南下渡冬。</p>

The reason for using the Animate software in the development of multi-cultural and media animation technology in this study is that an Animate can share the same material or animation fragments as components in animation and games, thus, reducing the time required for copying and redoing dynamic components.

#### 4.1. Animation development

4.4.1. *Animation procedure.* (1) Script. During this study, discussions regarding the fairytale were conducted with the elementary teachers, and the plot character settings and scene production drawings were made.

The main focus of the fairytale is that upon learning that the tears of the pitta nympa could heal his sick mother, filial Man C started his wonderful journey of looking for the pitta nympa, as explained in the storyboard script of Table 1.

(2) Character design

a. Character design:

In order to embellish character designs and scene styles, discussions regarding the production style were conducted with the elementary teachers.

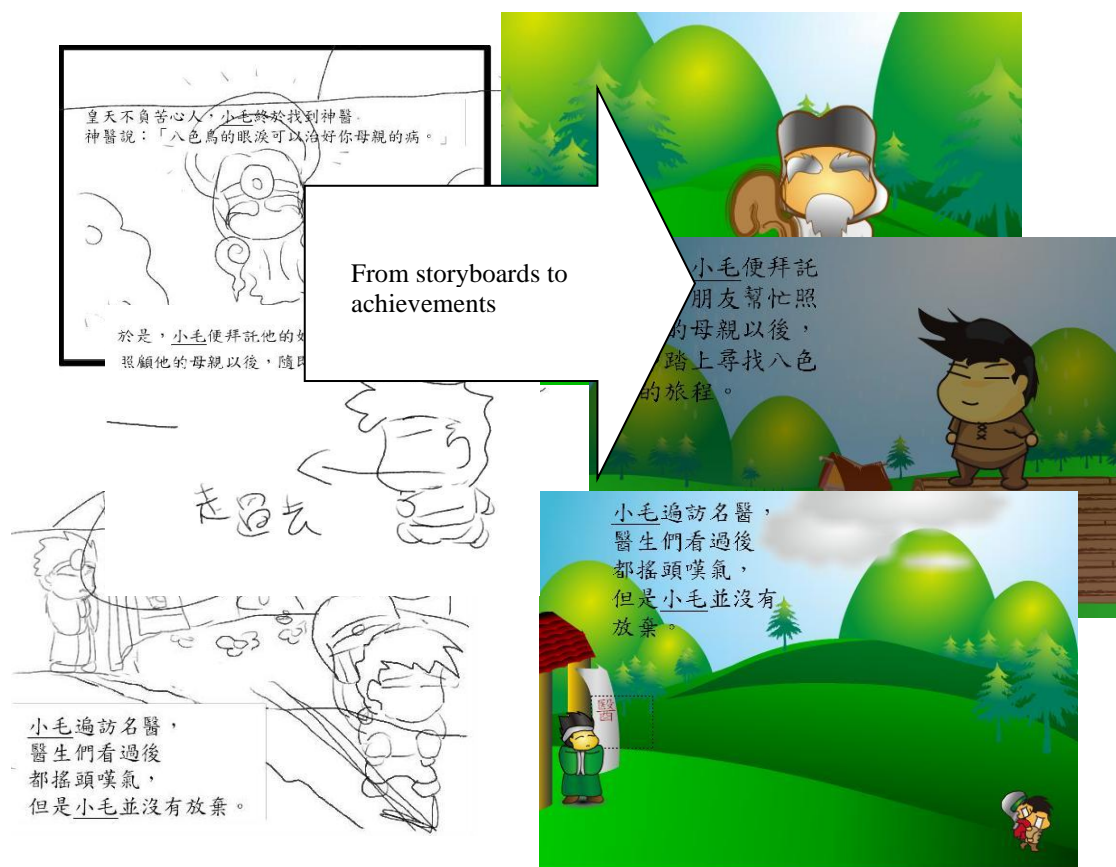
b. Drawing skills:

During production, discussions were conducted with the elementary teachers many times to adjust and reproduce the characters in the vector graphics. Priority was given to the designed action effects that met the teaching purpose.

(3) Storyboard drawing

a. Storyboard expression:

After character design was completed, the storyboard was drawn according to its style and plot collocation to present the interactions between characters and scenes, as shown in Figure 2.



**Figure 2.** Storyboard scene.

b. Specific content of storyboard expression:

(b-1) Scene sketch: The scene content was expressed in a simple style.

(b-2) Presentation of characters' actions: The researcher designed the characters' actions.

(b-3) Design of supporting characters: The researcher designed the supporting characters, such as floating clouds, butterflies, and fallen leaves, to create a dynamic scene.

c. Production start and discussion:

First, a static background and static characters were drawn according to the storyboard to simply present the atmosphere of the picture. Due to the post-production discussion and considerations regarding the difficulty of picture production, differences between the draft and the final work were generated.

(4) Animation production

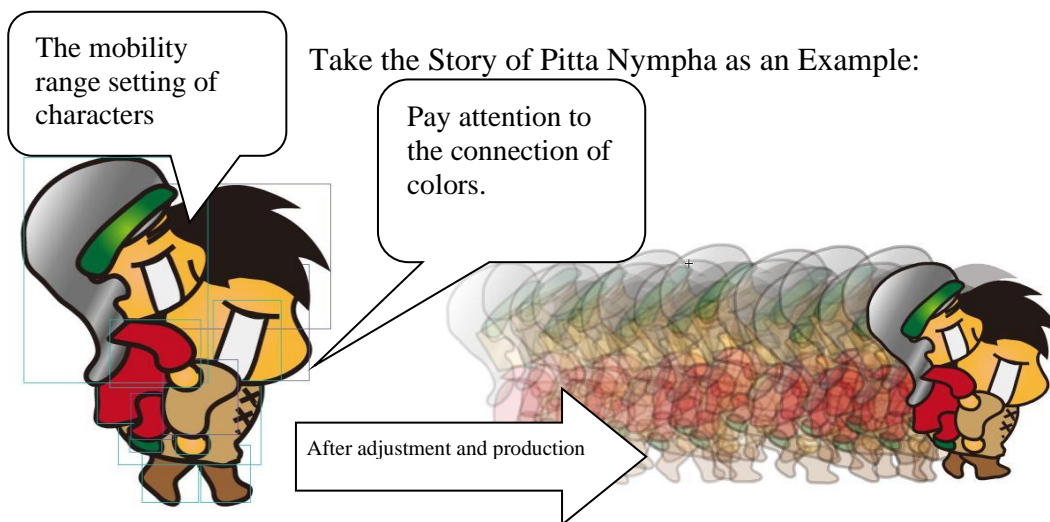
As shown in Figure 3 and Figure 4:

a. Character designs:

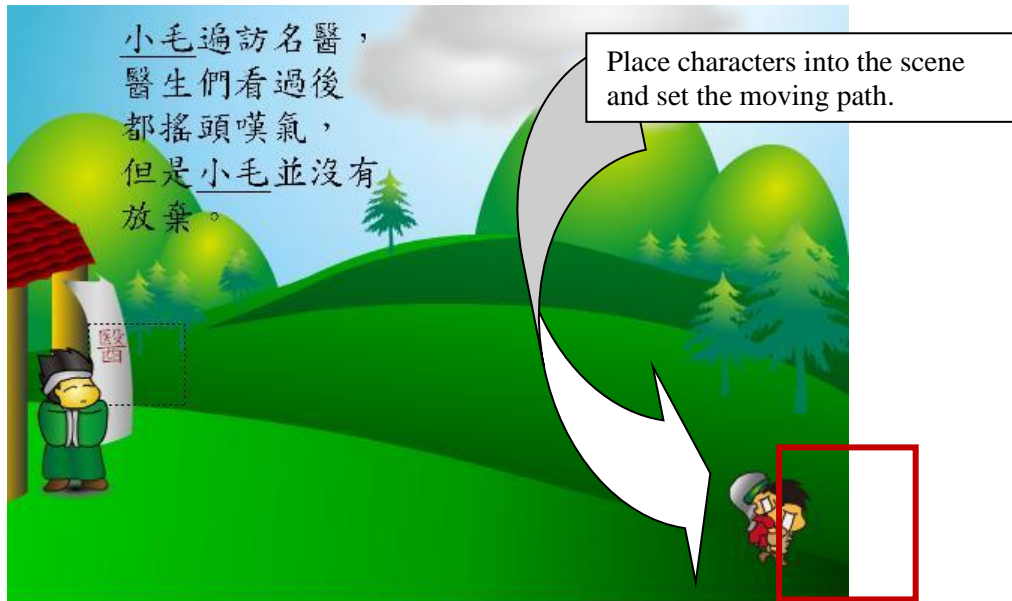
The drawn vector graphics character was placed into Animate's component library, and the various vector materials of the character designs were imported into Animate. The various pattern squares of the vector character were disassembled, and then, adjusted and configured as the characters' actions and the scenes' animation. After adjusting the movement mode of each joint of the characters or roles according to the layer, the dynamic effect of the character [Man C] walking with his mother on his back was presented.

b. Saving the animation as a film fragment:

Each character, role, and scene was made into a small animation, stored into components, and grouped into the components library.



**Figure 3.** Use animate to adjust actions of characters or roles.



**Figure 4.** Place characters in the scene.

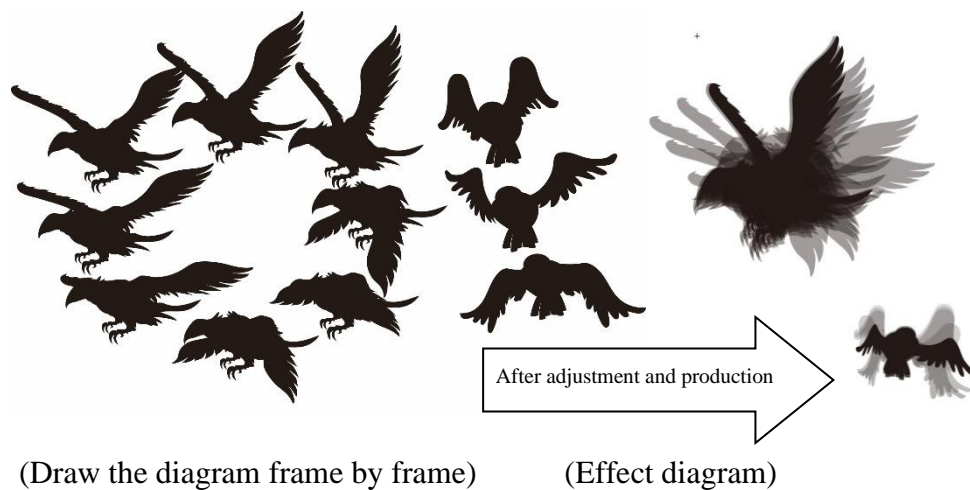
c. Skills and methods of animation production:

Observational method:

For example: In terms of a character's walking movement, each detail of every character was adjusted according to the walking mode of the actual characters or referring to the cartoon characters. Through continuous adjustment and testing, the action effect of the characters and the natural effect of the animation with mountains as the background could be perceived visually.

Drawing frame by frame:

Some actions with large deformation could not be dynamically deformed or moved by a single layer to achieve the desired effect, thus, it was necessary to draw the frames one by one, as shown in Figure 5.



(Draw the diagram frame by frame)

(Effect diagram)

**Figure 5.** Design character actions.

Cyclic animation method:

In order to create a sense of distance and movement, the characters or roles do the same action repeatedly, which is coupled with the moving path and size change settings.

(5) Subtitles

a. Subtitle settings:

Since the picture book narrates a complete story through words and pictures, the narrative of the content, as presented by the pictures, could be omitted in the subtitles of the post-production animation.

b. Subtitle production and presentation skills:

After translating the explanation text of the picture book into a dot matrix diagram file, the file was made into an animation, where the subtitles display the effects, and playback speed monitoring was configured and designed.

(6) Animation output

a. View of the overall animation play performance, which can be modified if necessary.

The story is the soul when creating a short animated film, thus, no matter what form the animation takes, the core of the animation is to tell a story. However, it is the organizational structure and overall arrangement within the story that determines how the story will be presented. Animation script writing requires that the beginning and the end echo each other, the story structure is complete, and the unique “picture sense” should be displayed according to different types of films during script writing. The interaction between characters, birds, and scenes is presented concretely to create a dynamic scene atmosphere. In addition, a sense of distance and movement was created through the moving path of objects and the settings of size changes; for example, the dynamic sense of the natural flight of birds that attracts viewers’ attention was produced by the moving dynamic path of the natural flight made in this animation. Roles, such as characters and birds, as well as scenes, were made into small animations, stored into components, and then, grouped into the component library for production. In terms of subtitles, post-production animation was adopted to display the explanation text effect in the animation. Furthermore, the drawn vector graphics character was placed into Animate’s component library, and various vector materials for character design were imported into the Animate software. After the various pattern squares of the vector character were disassembled, adjusted, and configured as the characters’ actions and the scenes’ animation, the movement modes of each joint of the characters or roles were adjusted according to the layer.

## **5. Conclusion and suggestions**

### *5.1. Conclusion*

The results of this study can be used for the curriculum design and teaching of multimedia software applications. The presentation of the story structure can help learners to apply their design thinking in the creative design process of multimedia production.

The steps of digital textbook production technology can be used in software courses, multi-cultural media courses, and as teaching materials, which produces multiple benefits.

E-learning has become a trend. The achievements of this study are the humanistic and natural creations of multi-culture and media digitization, which present the correct and readable communication contents of popular media science. Compared with paper drawings, this animated textbook has vivid and dynamic effects, and its contents include an understanding of human nature and the educational significance of filial piety. Additionally, it can guide students

to consider the importance of animal conservation and induce the emotions and follow-up actions of animal conservation.

This study provided the achievements of this animated digital textbook of pitta nympha to elementary schools in Yunlin County as educational materials, which were recognized by the teachers and students. After observing the dynamic movements of birds' outdoors, during class, students and teachers discussed filial piety and grateful hearts. Moreover, this animated story also had wide resonance in the university classroom, and the souls of the students were greatly nourished. Through animation media education, students were enlightened to conduct filial piety to their elders, show gratitude and feedback to their teachers and schoolmates, attach importance to biological conservation in their living areas, and develop an interest in local bird observations. Finally, the results show that the animated digital textbook of pitta nympha, as produced in this study, brought convenience to teaching for teachers and achieved significant multi-cultural education for learners.

Taking Storyboard 1 of the animation as an example, the filial piety shown through Man C's desire to cure his mother's eyes portrayed the significance of filial piety education. Taking Storyboard 6 of the animation as an example, the gratitude of the bird to Man C for chasing the eagle away and saving it portrayed the significance of gratitude education. Taking Storyboard 12 of the animation as an example, bandaging the injured bird can guide the students to care for birds, which can improve students' emotional cognition of filial piety, gratitude, and animal conservation, and then, trigger their behavior practice. Nowadays, digital media, such as the internet, Wi-Fi, and diversified mobile internet devices, have penetrated people's lives, and are widely used by the majority of the young generation. The achievement of this study is the creation of a vivid and short animated education film, which is easy to understand and can be made available to the general public on easily accessible networks, thus, more viewers can receive the knowledge brought by integrating humanistic multi-cultural content with media in creative animated stories, which can facilitate the popularization of online liberal education.

This study utilized software technology to develop an animated story, and the steps can be provided to students to give them e-Learning practical experience and cultivate their talents for humanistic creative stories and digital content production.

### 5.2. *Suggestions*

It is suggested that subsequent studies can develop and produce educational animations, as based on relevant themes regarding regional characteristics, ecology, and animal conservation, so that users pay more attention to and implement care for animal conservation issues.

The visual perception presented by animation is dynamic and more vivid than traditional books, which can be used by people of different ages or for parent-child education, and the expression of abstract concepts through the presentation of dynamic objects is easier to understand than general words. This study used the conservation of pitta nympha as the animation theme, in order to develop more creative animation related to the unique ecological characteristics of the earth in the future, promote ecological education through e-Learning, and market local characteristics. This animated story aimed to bring people's attention to the ecosystem and the natural ecology of the earth, which is in urgent need of protection.

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