Study of Teaching Sound Production of Multimedia
多媒體音效製作教學研究

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ABSTRACT

Multimedia production includes the five major media: text, images, animation, video and sound. Currently students in the learning and production of the first four of the media have made significant progress, but also can play a mode of thinking of e-generation to build a lot of very creative term project or a graduation practical project. However, both in teaching and learning the sound and sound effects, which is the final 20% of the audio portion encounter bottlenecks, due to a lack of qualified teachers who can integrate digital music and create sound effect needed, and the lack of professional musical hardware and software equipments in the school. Therefore, the teachers and students illegal use of copyrighted music in teaching and learning in their own project, potentially reducing the original work and can't be adopted in any contests. This research is to explore the multimedia audio production and mixing, and develop a set of processes to be followed for teachers and students. We hope our efforts can increase the knowledge of teaching sound effects and audio work to achieve much effect.

Keywords: Audio, Sound effect, multimedia, mixing.

摘 要

多媒體製作是一種包含：文字、圖像、動畫、視訊、聲音的五種主要媒體。目前學生在學習與製作前四項媒體已有長足的進步，能發揮 e 世代年輕人思考的模式，建立許多很有創意的學期專案或是畢業的實務專題。惟在聲音媒體與音效方面，由於能夠整合數位音樂又能創造所需的音效師資缺乏，與學校缺乏入門級的軟硬體設備，因此，在教與學上碰到許多瓶頸，以致師生們多非法使用沒有獲得版權的音樂，放在自己的教與學的專案中。正因為多媒體專案最後的 20% 是音效的部分，未能正確配音或加入背景音樂，無形中降低了作品的原創性，且無法獲得採用。本文目的是在探討多媒體的音效製作，對現有數位音樂編輯軟體運用在教學分析與比較，並發展出一套作業流程讓師生有所依據。本文亦指出數位音樂教學上可能遭遇的問題，並提出建議與改進做法，希望對於音效製作的教學能達到事倍功半之效。

關鍵字：音訊、音效、多媒體、混音

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1. Introduction

The motivation, study goals, and study method are described in this chapter to explain why the sound effects is help for student multimedia practical projects.

1.1. Motivation

Multimedia production includes the five major media: text, images, animation, video and sound. Currently students in the learning and production of the first four of the media have made significant progress, but also can play a mode of thinking of e-generation to build a lot of very creative term project or a graduation practical project. However, both in teaching and learning the sound and sound effects, which is the final 20% of the audio portion encounter bottlenecks, due to a lack of qualified teachers who can integrate digital music and create sound effect needed, and the lack of professional musical hardware and software equipments in the school. Therefore, the teachers and students illegal use of copyrighted music in teaching and learning in their own project, potentially reducing the original work and can't be adopted in any contests. This research is to explore the multimedia audio production and mixing, and develop a set of processes to be followed for teachers and students. We hope our efforts can increase the knowledge of teaching sound effects and audio work to achieve much effect.

Development of multimedia technology in domestic school is very fast. Because the post-production and the overall delicacy of such issues, their productions are not always perfect to meet industrial standards. The students who leave the campus have to run a long period to adjust such as the industry's quality requirements, and the application of advanced hardware and software. The schools are need specialized sound laboratories on campus to promote audio and video education, by video post-production laboratory equipment and industry experts suggestion that students will do their creative work and tune the final output become industrial products.

We closely observe the best producers and engineers in the audio world as they record, edit, and mix. We know many of them using similar techniques. This is because almost every one of them learned their skills from a lineage of other top-notch talent in the audio production industry. In digital musical production, we don't need a lot of money to create professional recordings, but we do need the expertise. Secrets of the pros from the good authors or musicians will speed we through years of trial and error, so we can focus on creating music instead of spending all your time trying to figure out the best way to make the gear work.

1.2. Study Goals

I used a student's 3D animation practical project - the Aborigine coexists with nature for this research to encourage students to finish audio work of their project in the future. The goal of this study is to develop a set of processes to be followed for teachers and students when they need to produce good sound effect for their project. We hope our efforts can increase the knowledge of teaching sound effects and audio work to achieve the best multimedia production.

1.3. Study Method

I have reviewed some famous music productions and literatures about recording as well as mixing. I had 40 hours training for professional sound engineer with icon to get an international teaching certification that is a good starting point. I used recording equipment and an affordable multi-track audio and MIDI recording software Mixcraft to do a practical way to finish this research. I found out some teaching techniques that can be shared with colleagues and students. I also want to shear the enthusiasm to the sound that is maturely generated from doing the sound production.

2. Literature Review

The important articles about the role of sound in multimedia, sound effects and mixing are reviewed in this chapter.

2.1. The Role of Sound in Multimedia

Mayer (2001) pointed out that the media is included: text, image (graphic art), sound, animation, video (send by computer) combination. Daft and Lengel (1986) considered that multimedia provides a wide range of cues, such as changes in voice tone, gestures, words, numbers, symbols, etc. These can increase the level of media richness, and thus reduce the uncertainty and equivocally of information and communication in an organizations. Vaughan (1993) also made animations could attract attention and then guide the user's attention to the information saying on the screen.

Larry Swanson (1999) focused on the abundance of rich media formats to make sorting and comparison, found richness increased from the text, images, dynamic images, and add music and programs. Lindstrom (1994) studied on the characteristics of multimedia elements, and

mentioned when the media applied to the artistic level, it can look deep into the mind, and moving sorrowful mood. Therefore, the clever use of media is necessary. We should understand the characteristics of different media, wisely use of text, graphics, sound, moving images to touch the hearts of the audience.

Du (2009) studied electronic music to break the traditional use of musical instruments, and produce a new style of music. These are because the computer science and technology developed in this era and then derived from the product. Du used this advanced resources, griped the principle of each sound has a mood, to the idea of "Magabahai" soundtrack. In addition to the traditional instruments, electronic music synthesis effects, more extensive use of return to the original nature sounds, birds singing, the wind blew on the leaves, the sound of a bicycle, to music as an important element in synchronization with the image, creating a fictional but plausible natural music world, and walking in the realistic and non-realistic ambiguous edge.

Clark (2010) thoroughly investigated at the recording world, and in-depth collection of interviews with recording, mixing, and producing legends covers everything from recording strings and horn sections to using creative production techniques on the latest musical styles in which we can learn plenty of technical information for an engineer, and lots of heart for a musician, Clark also provided on production philosophy, field recording, film sound and game audio. He said "Evolution, Where we are, looking forward, giving Back and life stuff."

There is nothing quite like the sound of the well-recorded musical interplay found in an ensemble of acoustic instruments. Capturing the unique individual characteristics of each instrument and understanding how to present the chemistry of the overall band sound requires skill and sensitivity to the special dynamics of the players. Wayne Kramer (2007) said "Based on my experience, succeeding in life has more to do with character than it does job skill." David Kershenbaum (2007) believed all of the arts, whether they are paintings, books, movies, or records, deal with playing on people's emotions. He thought for an sound effects artist who was not about throwing something together to try to make it big, but was committed to make something meaningful and well thought out and had real emotion, would cause word of mouth to spread about them, because he think great music reaches its own level. We can't stop it.

If we go into the sound studio with the production attitude of "I'm just going to make tracks and throw a bunch of stuff on and put a vocal and see what works later," We'll likely end up with something very unremarkable. It's important to think of the production in terms of the organics of the song form. Then it turns out to be a much more alive kind of experience. We should amaze at the results because it causes you to think in terms of the overall emotional picture rather than getting stuck in.

2.2. Sound Effects and Mixing

Yan and Chen (2009) proposed stack sound methods, including: equalized sound effects on each voice added (e.g. reverb, compression), or in a different octave to copy tracks. These methods can help us create a wonderful sound track stack. They also suggested that in dealing with the huge stack string should be especially careful. The stack effect created by the main theme of the song may sound completely undone. The use of a single countermelody producing change is simple and can be maintained which is not only the increased in the mix deep sense of the song, but also a good way to not interfere with the main theme.

The best engineers have trained their ears to immediately recognize audio problems that the consumer and those new to recording arts would likely not hear, but that, if left unresolved, would result in an amateurish final product. The ability to properly discern sounds, identify subtle problems, and act accordingly to apply the necessary fix makes all the difference in the quality of the final tracks and master. These crucial skills can be learned. The ability to instantly identify frequencies, hear hidden distortions, and instinctively reconcile conflicts in the EQ of instruments, audio elements, vocals and more are traits of those who have mastered the art of audio production (Everest, 2007).

Owsinski (2006) interviewed a wide variety of well-known, professional mix engineers and compiled the six elements of a mix: element 1: Balance-the mixing part of mixing, element 2:Panorama-placing the sound in the sound-field, element 3: Frequency range-equalizing, element 4:Dimention-adding effects, element 5:Dynamics-Compression and Gating, element 5:Interest-the key to great mixes.

Working as a recording engineer presents challenges from every direction of your project. From using microphones to deciding on EQ settings, choosing outboard gear to understanding how, when

and why to process your signal, the seemingly never-ending choices can be very confusing. Owsinski (2009) took us into the tracking process for all manner of instruments and vocals—providing us with the knowledge and skill to make sense of the many choices our have in any given project. This is a very useful starting point when recording a new instrument for the first time. It gives you in depth details about mixing positions with clear pictures to support what the author is writing about, for instance, why you should pick a ribbon microphone over a dynamic in the situation at hand.

When several tones are sounded simultaneously, the result may be considered as either pleasant or unpleasant. Another way of describing these sensations is with the terms consonant and dissonant. In this psycho-acoustical context, when we say consonance, we mean tonal or sensory consonance. This is distinguished from the musician's use of the word, which is dependent on frequency ratios and musical theory. Here, we are referring to human perception. Of course, in an ultimate sense, the two definitions must come together. The audibility of these roughness effects does not depend on musical training.

Mixing is an art, and also a specialized technology. The interpretation of sound is combination work of skills and mixed. It is neither artistic nor technical. It is a sense of magic from the pure voice to a melodious, and also gives music a lively indescribable!

It is often necessary to estimate how much a sound level changes. Our ear interprets sound level changes as changes in loudness. The decibel is a very convenient unit for measuring signal levels in electronic circuits or even sound pressure levels in air. However, changes in the loudness of sounds as perceived by our ears do not conform exactly to corresponding changes in sound level. The sound of the various instruments of the orchestra range, more or less, over the entire 20 Hz to 20,000 Hz audio spectrum. The human voice, on the other hand, covers a narrower range.

The program material we are interested in listening to or recording we shall call the signal. Any sound that interferes with enjoyment or comprehension of the signal is called noise. If the signal dominates, that is excellent. But if noise dominates, the signal is useless. The relative strength of the signal compared to that of the noise is a very important factor in all communication systems. We even have a name for it: the

signal-to-noise ratio. If the desired signal dominates, the signal-to-noise ratio is high, and all is well.

The effect on the sound of a voice of peaks and dips is in the response of an audio system. We shall concentrate on various acoustical effects which make a voice sound unnatural. In recording a voice in a room, there is no escaping the acoustical effect of the surroundings. The sound is contained by the surfaces of the room; and size, shape, and proportions of the room, and the absorbing and reflecting characteristics of the surfaces determine the sound field in the room.

Distortion in amplifiers, loudspeakers, and other pieces of audio equipment is a matter of deep concern, not only to the designers of such equipment, but also to those using it. High fidelity sound requires low distortion in each link of the audio chain, because the distortion of each link adds to that of other links. All this attention to distortion in equipment is for the purpose of preserving the full quality and naturalness of the original sound through the transmission, recording, and reproduction processes. When the signal applied exceeds the limits of the system, the waveform of the signal is distorted and new frequency components or distortion products are generated. This is true of all audio systems, whether physical or physiological.

The main concept of equalized applications such as is to adjust the sound of the audio content (quality, Timbre), so that the sound in the overall mix will show remarkable qualities. But before making such applications, it should be:

(1) understand the frequency range of musical instruments or sound.

(2) basic concept of each frequency range can affect the overall sound.

(3) listen carefully to the sound of the background environment (when the other tracks are playing).

(4) clear idea to present the voice.

We shall hear and feel the solo voice, and then listen to the sound mixed together with other instruments for the overall sense of playing. We should pay special attention to certain frequencies which are shared by all kinds of other musical instruments. Changing of any settings in a particular instrument will affect not only the instrument itself, but also the sound of musical instruments and interaction with other voices. Therefore, we can not only listen to the solo track while EQ changed.

Equalization may be able to make tracks sound pleasant when play solo, but it may be miserable when it resembles with the other instruments.

3. Producing Sound

The theme 3D animation video is showing mutuality and coexistence of the Taiwanese Bunun tribe and the nature. We hoped this short film can bring audience thinking deeply how we can coalescence different tribal groups and integrate with the nature. Let us to know the Bunun culture better, to learn how people can enjoys with the nature, as well as people treasure and avoid wasting all livings. This research with 3D animation presents mutuality and coexistence of the Bunun tribe and the nature in vivid ways. We hope the audiences can have peace and clear mind after watching this 3D animation, and put more effort to ecology-care education, and then our goal will be achieved, that the ruined Taiwan's environment may restore its vitality. I working procedure

3.1. Set up the Digital Audio Workstation

The software and hardware required for sound effects and recording as shown in Table 1.

Table 1 Software and Hardware Requirement for Sound Effects and Recording

Name of equipments	Purpose
Notebook computer	Window 7 32 bits OS, RAM 4GB, HD 500 GB
iCON CUBE MINI Mobile Recording Interface	Record OS, sound effect, with internal recording function, guitar recording
iCON i-Key 25Mobile Keyboard	Midi input
iCON HP-360 Professional headset earphone	Smooth, frequency response pure sound output, monitor recording
Acoustica Mixcraft 5	Professional multi-track recording software , monitor real-time recording, and midi system of spectral features.
iCON M3 Professional microphones	for studio and live recording, with low noise and wide low frequency response, providing vocal and instrument recording

We have to install driver for icon cube mini on the computer. After installation, we need to set the default voice play to CubeM Out 1/2 for sound on control panel. We set driving mode: ASIO (Audio Stream Input/Output), default input (recording): CubeM Analong in 1/CubM Analog in 2, and default input (play): CubeM out 1/CubM out 2 on sound card/interface panel on the Mixcraft preference. We also set midi input device: icon ikey V1:02, default virtual instrument: acoustica instrument on midi panel on the Mixcraft preference.

We need to adjust streaming buffer size to extra small, and ASIO buffer size to small on icon control panel to avoid sound delay for recording. on the other hand, we need to adjust streaming buffer size to safe, and ASIO buffer size to maximum on

icon control panel for mixing.

3.2. Collecting Sound Materials for Sound Effects

The 3D animation video was edited to 1 minute 10 second to simplify the processes, the scene 2, 5, 6 were chosen for the demonstration purpose. I would like to show mutuality and coexistence of the Taiwanese Bunun tribe and the nature in 3D animation video. According to the sound and sound effects list as shown in Table 2, I use the Bunun eight part harmony, prayer Millet Harvest Song, and Mu Chu sound as background music to generate the atmosphere of Taiwanese aboriginal. I spent two days to search the sound or sound effects in sound databases of Mixcraft and CDXTRACT. If the sound effects on the database

are suitable to the scenario in the animation video, there are great to finish the work. But most of the time, we cannot find the proper sound or sound effects for the particular scenarios. We have to record the sound in the studio or taking potable equipments to record outdoors by ourselves. We can buy or get free download sound effects or sound loops on famous websites, e.g. Soundsnap, the Hollywood Edge, Sound idea, Sound dogs, Sound Works, Mixonline, and Audio Technica.

Table 2 Sound list for the Aborigine coexists with nature 3D animation project

Scene	Start time	End time	Length	Explain	Sound effects
Final Video output			00: 08	Poster image text titles	Background music of the Bunun eight part harmony, prayer Millet Harvest Song, Mu Chu sound
Scene 2　Forest hunting	00:00	00:03	00:02	Running in the forest	Background music of the Bunun eight part harmony, prayer Millet Harvest Song, Mu Chu sound,Vocal Ooh 1, birds Background.
Go to the forest in shady grass, grass in the commotion, followed by wild boar appear.	00:04	00:04	00:01	Warriors hidden in the next tree, waiting　the wings wild boar hiding in the bushes	Audible friction sound for low bushes, wild boar humming sound, SkiFallSnowA +5S
	00:05	00:06	00:01	Wild boar come out and foraging	Audible friction sound for low bushes, voice of wild boar sniffing, boar walking
	00:07	00:09	00:02	wild boar found by the Warriors, he spread out the net to catch the boar, wild boar trapped, the warriors swarmed and roared then tied the boar in the wood.	the warriors swarmed and roared, voice of spreading out the net, voice of the net dropped.
	00:10	00:10	00:03	Warrior netted wild boar	Wild boar wailing sound
	00:11	00:16	00:05	Warrior holding spear ran to wild boar	Warrior jumping sound (man jump)
	00:17	00:18	00:01	Warrior high kneeling in front of wild boar	Bundled voice, hit the wood sound, Warriors: we catch, Brave!
	00:19	00:27	00:06	Brave thanks to nature	Oh, the background noise (Vocal Ooh 1), Brave: I thank the gift of nature with our dinner, we always appreciate your giving for all to us.
Scene 5 Awakened Night's Dream	00:27	00:28	00:01	Di-Ang's mother found out he is missing.	sound of padding man's back

Black curtain slowly with lighting, the picture is a woman (Wu-Fa) with terror able face.	00:28	00:30	00:02	Wu-Fa horribly inform Brave the child Di-ang is missing.	Wu-Fa: Wake up! Wake up! Brave! Bad! Bad! Child was missing!
	00:30	00:32	00:02	Brave quickly rush into the forest.	Brave quickly rush into the forest. (man runs on grass)
	00:33	00:36	00:03		Brave's heartbeat mixed with the voice of running in the forest. (man runs on grass)
	00:37	00:38	00:01		Brave's heartbeat and deep breathing sound.
Scene 6 Close call.					
Black bear smells Di-ang, and he falls to the ground.	00:39	00:40	00:01	Black bear sniffs tentative to Di-ang.	Black bear sniffs sound(Bear)
	00:41	00:43	00:02	Di-ang falls to the ground, and shouted for help.	Fell to the ground sound, Di-ang: Do not! Do not! Go away! Dad! Here I am and save me! Brave: thrilling surprised sound!
	00:44	00:49	00:05	Brave arrives and saw the bear near the child, then threw spears.	Brave shoots the spear with uh sound, landing spear through the woods sound, to frighten bears away.
	00:50	00:53	00:03	Black bear finds Brave and try to attack him.	Black bears roaring sound.
	00:54	00:57	00:03	Brave rush to the bear, and put out of hunting knives	Running in the forest sound, the voice of knife sheath out.
					Brave: Do not be afraid, Di-ang, father come to rescue you.
	00:58	01:00	00:02	Black bear rush to Brave.	scared sound (BearGrowlBig), Black bear roaring sound. (Bear)

3.3. Performing Outdoor Recordings

We took portable four-track recorder, dedicated stereo or mono microphone, and headphone listening monitor. The devices used in synchronous recording in Table 3 and Figure 1. We recorded sound of running steps on grass or on the ground, and environmental noise outdoors as shown in Figure 2. When we perform synchronous recording, some do and don't should be done: don't wear the material emits noises clothes (such as: nylon), don't leave any copper coins in pants pocket, so any movement will not generate noise, the sound recording engineer must take the time code shown on the screen in dubbing room, so that staff can record the sound with time. Three transmission methods of multi-track recorder are: USB transfer function, SD / MD Card storage discs, and audio output to audio adapter. Device used in

Synchronous Recording as shown in Table 3.

Table 3 Devices used in Synchronous Recording

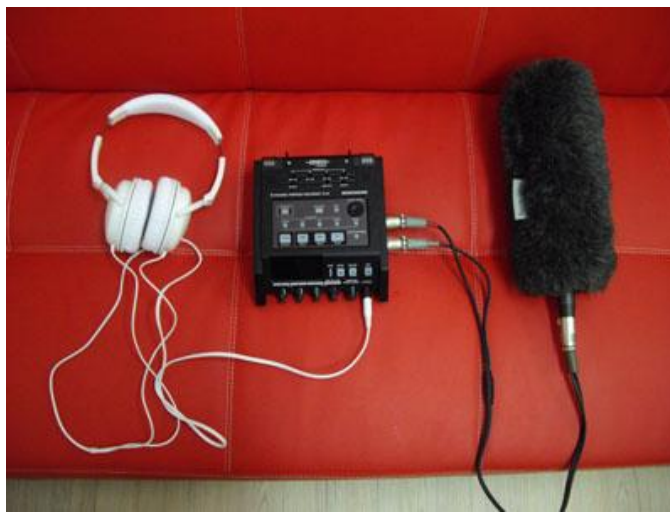| Name of equipment	Purpose
Editor R44 Potable recording set	Outdoor recording use
Fostex MC-10ST Stereo microphone	Environmental sound recording
JST JS-22 Capacitive microphone	Indoor, vocal, sound effects recording use
Microphone wind shield	prevent from recording the sound of wind shear
iCON HP-280 Headphones	monitor the recording

Figure 1 Outdoor recording equipment, from left to right order: Headphones, portable four-track recorder, and stereo or mono microphones with wind shield.

Figure 2 Environmental sound recording operation.

3.4. Post-Production Digital Recording and Laboratory-Interior Recording

In response to the needs of digital content trends, digital audio post-production laboratory, towards the integration of multimedia digital video post-production capabilities for the development goals, and nurturing students with the ability to video editing, music, voice, make sound effect. They can complete their works for network applications and join competitions and exhibitions at home and abroad. Meanwhile, the overall audio-visual capabilities have be enhanced to industry standard to promote the scholar-industry cooperation. The Laboratory will provide students to design post-processing development project with equipments: industrial class professional computers, SONY VEGAS PRO audio and video editing software, STEINBERG NUENDO 5 audio editing software, iCON QCON MIDI controller, ICON UMIX12 mixing Block, STEINBERG MR-816 CSX recording interface, ICON DT-5A AIR monitor speaker groups, professional microphone, and other important equipment as shown in Figure 3.

Figure 3 Sound editing and mixing in digital audio post-production laboratory.

3.5. Put Sound and Sound effects on the Track

I put all sound and sound effects on each audio track, It is easy when we can see the pitch on the track. The sound phase must set right direction to generate the spatial sense as shown in Figure 4 and Figure 5.
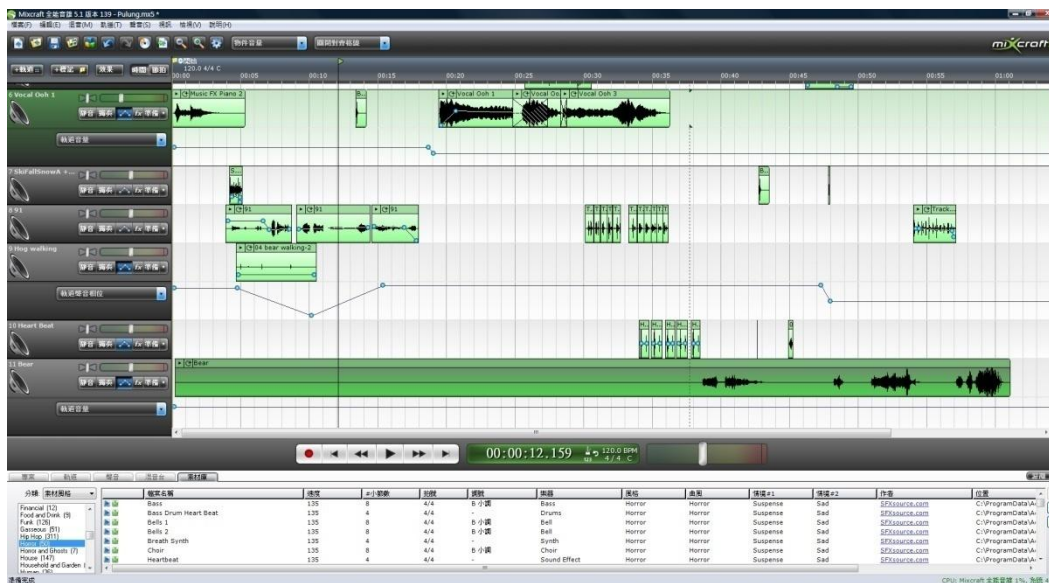

Figure 4 Editing Windows of Mixcraft 5.

Figure 5 Recording and sound phase adjustment on Mixcraft 5.

4. Mixing

The meaning of mixing is to adjust the volume of each sound on digital audio workstation (DAW). The sound comes from the left loudspeaker, or the right loudspeaker, and space to show sound clarity and realistic sound of the video. Essentials of mixing are: (1) Sound has just the right size of weight. (2) clear direction of the sound. (3) fine-tune the spatial effect. (3) clear mixed production.

4.1. Mixing Processes

Mixing processes are showed as followings: (1) preparing all of the vocal voice, sound effects and music clips. (2) arranging the tracks on the DAW. (3) playing the video side of the body while fine-tuning the volume and direction of the phase. (4) adjusting carefully the video content space in accordance with sound, mastering processor to ensure the sound use of saturation without broken. (5) checking the mixed product. (6) outputing the product as shown in Figure 6.
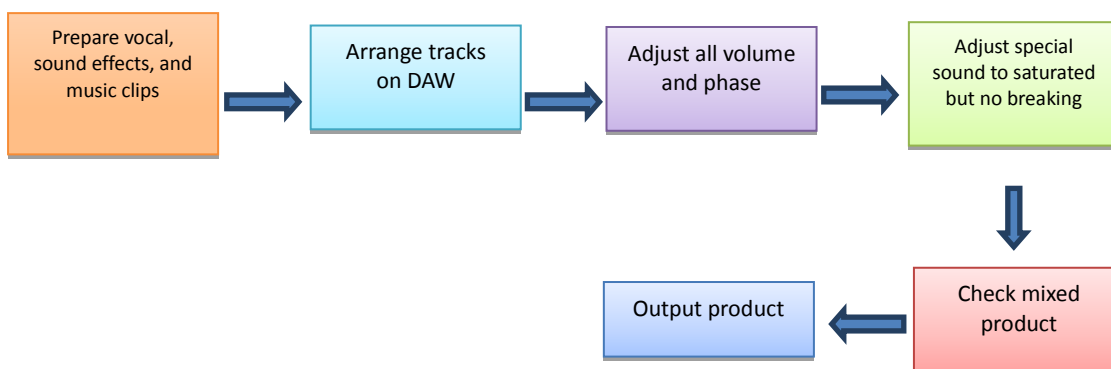

Figure 6 Mixing process

Before starting mixing, we have to confirm music, OS (vocal voice) and sound clips arranged on DAW as shown in the Figure. The music is placed on the first track, vocal on the second track, the sound and environmental sound on the after tracks. The place of loudspeakers need to accordance with sound engineer sitting position, and volume of loudspeakers must not too high or too low. It is best to keep at 0 decibels of sound-pressure level (SPL). The higher the decibel value, the volume will be. Another good sound will not be confirmed because no good tune recording interface buffer and the resulting sound is distorted.

We can use the built-in effects categories in Acoustica Mixcraft, for instance: Acoustica EQ equalizer able to receive incoming voice or tune into a thick sound brighter. Acoustica reverbration effects, Reverb, can be transferred into overall sound in small rooms and even the entire space in the sense of the Grand Canyon. Acoustica compression effects, Compressor, used to compress a sound volume and the largest difference between the minimum volume. After compression, reduction of difference between the maximum volume and minimum volume, the overall volume can be tuned as much as we like. It is noted that if it applied to the human voice, the noises will also be magnified.

The next is to fine tune the overall volume, the sound phase, which is the sound coming from the left loudspeaker or the right loudspeaker (Make sure the left loudspeaker and the right loudspeaker of the stereo equipment is already adjusted properly.), with spatial sound. Some mixed will be louder, and this will bring out the mood of the whole music. OS is louder than the music, the OS is transmitting message and in most of the time OS must not be covered by the other sounds. Mixed with a mixer on OS side would be more certainty about the first person and second person voice is in a different direction. Sound effect mixed will be also loud, and left and right direction variations. The last track made of human noises, it will not conflict with the music and OS. Final procedure, that is coupled with Finalizer mastering processor, the effect of giving a more refined sound and then saturated sound not broken, and the production will be done.

4.2. Combine Mixed Sound and Video Using Video Editing Software

Sony Vegas video editing software used to add video clips, special effects, subtitles and video with digital sound and video clips. Flow diagram as shown in Figure 7:
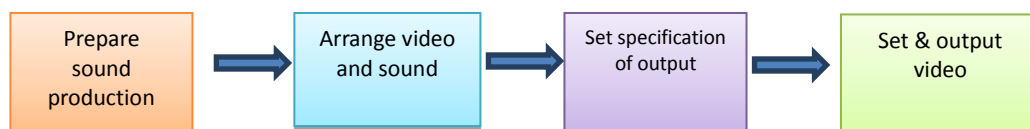

Figure 7 Combination of video and audio production process

We may use Mixcraft to combine the mixed sound and video, if we don't need any titles or notation about the video. The other video editing software is suitable for the editing such as: Premiere, Movie maker, or Power director, etc.

4.3. Output the Final

The 3D animation video was placed on video track, mixed sound placed on the audio track, and subtitles placed on video track, respectively. The resolution for the final output video was set on 720 X 480 pixel. 29.97 0i frame with length 1 minute 11 second. One frame of the final product is shown in Figure 8

Figure 8 One Frame of final output.

5. Discussions

Five musical software have been compared for their function and price, and problems and solutions for learning and teaching digital music production have been discussed in this chapter.

5.1. Comparing of Musical Software

In this study, five musical software have been selected for comparison. Mixcraft and Music maker are loop based with friendly Chinese interface and reasonable price, so they are suitable for beginner. We recommend these tow software are affordable and suitable for a 60-student class. Sonar with world-class instruments effect and smart tool for intermediates and it can be worked in studio. Pro Tools with rich and rounded sound field, and clear level, on the other hand, Nuendo seems has narrow sound field, and less obvious sound level.

Table 4 Comparison of Musical Software for Teaching and Learning of Digital Music Production

Software	Mixcraft	Music Maker	PRO TOOLS	Cakewalk Sonar Producer	Nuendo
Brand name	Acoustica	MAGIX	Avid Digidesign	Roland	Steinberg
Characteristics	Chinese Interface, Arrangement software for beginner	Chinese Interface, Arrangement software for beginner	Recording and Mixing software for intermediates	Good instrument effects, smart tool for intermediates	Composing, arrangement, recording, mixing, and mastering software, stable for advanced user
Certification	AMCA、AMCI	Basic, Standard, Advanced	101, 110, 201, 210M	CSCA, CSCI, CSCE	None
Working on	PC	PC	PC, studio	Work Station	Studio
Loop Based	Yes	Yes	Yes	Yes	Yes
Quick Composition	None	Yes, may produce canned music	None	None	None
USD $	172	172	300	400	2495
Recording interface	Required	Not required	Required	Required	Required
Sound Quality	High	Medium	High	High	High

5.2. Problems and Solutions for Teaching Digital Music Production

The student must practice to adjust the voice of reducing, rising, pausing, and ceasing of the tone, and the sense of rhythm on with the role of emotional changes during vocal recording. They must know well with the lines, and follow the video on the monitor screen, words come out right on the track. It can be improved by drills repeated.

Composing music always is a difficult job for a no music background teacher and student. It is recommended to use Music Maker software, which has a quick composing function to produce a musical prototype for any style and rhythm, and then it can be refined to the music needed.

In sound production, the difficulties are the loops in the library can not provide all we needs. Students need to be more creative, by using handy tools and producing surprising sound effects. Sometimes, they have to use their own voice to imitate animal's sound, such as: finding food or fighting with another animal. It is required practice, observation and imitation. They must understand the variation of sounds when the animal is eating or fighting, then it can be coupled with sound modification effects to complete the task.

After learning to produce sound and music, students may enhance their ability to identify the sound heard and inspire their creativity. Students learn from script writing, character design, modeling, texture, animation, musical production, and then exported their great jobs. After a series of creative and learning process, they can get a sense of accomplishment and satisfaction, and completion of a project to develop good habits to focus on job.

6. Conclusions and Recommendations

The conclusions and recommendations of this research are described in this chapter.

6.1. Conclusions

The value of the universal experience was used by some mix engineers for decades. It can not solve all the problems and ensure to create elegant and charming voice, or the overall mix is impressive, but can bring us into right field. Only open our ears and listen carefully to determine which voice is the most pleasant for us to hear. Knowledge on the book can only help us be more close to the core, and the key to determine is to rely on oneself master.

Beautiful music is capable of reaching deeply into our souls, imparting peace and tranquility.

Proper use of background music can create the atmosphere you want to in the animation. The music must come out before the animation scene, such as: compact and fast-paced music can create a tense atmosphere, enabling audience to be prepared for the psychological, next plot development. Similarly, the lively music can create a relaxed atmosphere. The reason why the game is able to create animated social presence, is the use of multimedia sound and light and sound effects, so that player can feel ups and downs with the plot development with an audience.

After learning to sound effect and music, the creativity of students in sound can be enhanced, and observation and recognition of the ability to sound can be great improved. Students conduct multimedia project from script writing, characteristic design, modeling, texture, animation, dubbing music, and finished product then output, in a series of creative and learning process. They can get a sense of achievement and satisfaction, develop focus and complete a project in good habits.

6.2. Recommendations

As a sound effects teacher, he/she need prepare a lot of materials for sound and sound effects. The creative and imagination are two weapons to success the teaching work. Multimedia projects are very time consuming. We usually need to do our work in the midnight even we have to burn the midnight oil. But the result is worthy, when the final 20% of the audio jobs are well-done especially the project may win the prize in national or international contest. For an sound effects artist or engineer who was not about throwing something together to try to make it great, but is committed to make something meaningful and well presented real emotion and felling.

Special Thanks

References

1. Clark, Rick, 2010. Mixing, Recording, and Producing Techniques of the Pros: Insights on Recording Audio for Music, Video, Film, and Games, 2 ed., Boston: Course Technology PTR, pp. 416.

2. Everest, F. Alton, 2007. Critical Listening Skills for Audio Professionals Book, 2nd edition, Artistpro, pp. 218.

3. Daft RL, Lengel RH., 1986. Organizational information requirement, media richness and structural design. Management Science, Vol.32: pp.554-571.

4. Izhaki, Roey, 2008, Mixing Audio: Concepts, Practices and Tools, Burlington: Focal Press, pp. 584.

5. Lindstrom, R., 1994. The Business Week Guide to Multimedia Presentations: Create Dynamic Presentations That Inspire, New York: McGraw-Hill: pp.33-46.

6. Mayer, R. E., 2001. Multimedia Learning, New York: Cambridge University press, pp. 222.

7. Owsinski, Bobby, 2009. The Recording Engineer's Handbook, 2nd edition, Boston: Course Technology PTR, pp. 424.

8. Owsinski, Bobby, 2006. The Mixing Engineer's Handbook, 2nd edition, Thomson Course Technology, Boston, MA., pp. 260.

9. Swanson, Larry, 1 999. Rich-Media Advertising, workz.com. Retrieved September 9, 2000, from http://www.workz.com/content/510.asp.

10. Tu, Chun-Tang, 2008, Creation description of "Magabahai", Master Thesis.

11. Wen, Zhi-Hao, and Lui Zhi-Jie, 2007, Computer music easy play - Music Maker, Showwe information.

12. Yan, Zhi-Chang, and Rong-Gui, Chen, 2009. Digital Music Produce, Vision Quest Media Publishing.