Study on the Performance of Animation Who Major in Study Area of Design and Departments from Vocational and Technological Colleges and Universities

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***Abstract*—The purpose of this study is to explore the performance of animation imagination among students who major in Study Area of Design and Departments of Animation from Vocational and Technological Colleges and Universities, using survey research methods during the study processing to develop the tool of imagination rating scales through animation, literature on the subject of imagination, and consulting with professional. The study objects consist of total 358 students from 10 classes, majoring in Study Area of Design, Departments of Animation, from the regions of North, Middle, South and East Taiwan. After they fill out the Animation Imagination Rating Scales, the Fictions, Designs & Values of Themes and Probability of Technical Value from collected data will be analyzed via variables. The research result has been found: it makes difference performance of animation imagination between students who major in Study Area of Design and Departments of Animation from Vocational and Technological Colleges and Universities. Generally, students from departments of Multimedia Animation and Multimedia Design have achieved better performance of animation imagination with above-average grades among other departments. Students from departments of Multimedia Animation, Multimedia Design and Animation Section of Department of Information Management have done a better job on Fictions of animation imagination; students from departments of Multimedia Animation and Multimedia Design have done a better job on Themes of animation imagination; students from departments of Multimedia Animation, Multimedia Design and Departments of Animation, Television & Film and Animation have done a better job on Technical Design of animation imagination; students from departments of Multimedia Animation and Multimedia Design have done a better job on Possibility of Value of animation imagination to show higher performance of Self-Value.**

***Index Terms*—Animation Imagination, Vocational and Technological College and University, Area of Design.**

I. Motives

Imagination is a thinking process in human nature. Expectations and thoughts in your brain can be depicted during the thinking without limits to mental activities and iconic ideas. Human creativity and invention can come to existence through imaging, further, science and society can be developed and accomplished. In spite of imagination's importance to human mental development, it has not made many results in past researches compared with others such as critical thinking, problem solving, and creative thinking. The past researches on imagination tended to focus on the fields of philosophy and literature, for instance: philosophical thinking and discussion with an aim at the nature of imagination, subject studies on the imagination during the process of literature creation; animation performance lacks of discussion in arts, either [1]-[6]. For the field of education, there have been less systematic researches; even there are some, most of them aim at the studies on young children's imagination. Usually, older students, particular college students, are not the study objects. This study is the research subject of 2010 Research Project, the National Science Council of Taiwan – Imagination Training and Evaluation of animation teaching in Vocational and Technological Colleges and Universities, which will supplement the shortcomings of the researches mentioned previously. We will stress on the real performance of Animation Imagination among students, who major in Study Area of Design and Departments of Animation from Vocational and Technological Colleges and Universities to work on relevant analyses for future reference to inspire students' animation imagination in Departments of Animation, Vocational and Technological Colleges and Universities.

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II. Purposes

The purpose of this study is to explore the "The Real Performance of Animation Imagination among Students Who Major in Study Area of Design and Departments of Animation from Vocational and Technological Colleges and Universities" in order to develop students' animation imagination that will reinforce and guide students' performance on animation imagination. Specifically, the purpose of this study is to explore the performance of animation imagination among the objects, who are students majoring in Study Area of Design and Departments of Animation from Vocational and Technological Colleges and Universities.

III. Literature Analyses

A. Connotation of Imagination

Imagination performs the function to have everything symbolized that it is capable of getting something unseen to

be integrated and symbolized through these mental processes of perception, symbol structure, memory and reasoning [7]-[9]. Imagination has four aspects: 1. Trigger for Imagination: imagination process is triggered by senses, no matter by vision, hearing, touch, smell or taste, you can imagine what a thing looks like when passing a place, entering similar experience of visual perception [10]; 2. Fiction of Imagination: imagination can be originated from a process of fantasy that makes a process spontaneously having vision and hearing of something in your dreams to form possible images, just as you feel some people, things and objects in front of your eyes very likely true owing to imaginative images [10]; 3. Combination of Imagination: imagination focuses on the activity of mental awareness toward non-existent things to perform a series of illusionary design and combination that will make a psychological form surpassing externality [11]; 4. Possibility of Imagination: imagination is a thinking activity to generate new images and concepts, in a result, it will create more new images for any possibility [11].

B. The Rating Method of Imagination

Imagination means new combination of old experience, encourage latest information from what you have known, and the ability of idea association with non-existent things that it can goes free absolutely without restraint. Therefore, a French psychologist Binet had suggested as early as the beginning of 20th century, the imagination should be evaluated with open topics, such as the Test of Storytelling by Ink Blot to measure the imagination [12]. The evaluation approaches of imagination can be divided to quantitative and quality assessment. For example, quantitative assessment applies Test Paper, Rating Scale of Attitude & Inclination, Performance Assessment and Portfolio Assessment; quality assessment does oral assessment, observation assessment, Biography Scale, Presentation of Activities & Accomplishment, assessment by teachers, peers or superiors, and so on. Less rating scales focus on inner self-evaluation development for those who are imagining, particularly during the learning process of animation imagination. This study develops the Rating Scales of college students' animation imagination to measure the thinking of those who are imagining, whether they can be thinking free and unrestrained to establish the processing of inner psychological images that will explore the real performance of animation imagination among the students who major in Study Area of Design and Departments of Animation from Vocational and Technological Colleges and Universities.

C. Animation Imagination

Animation consists of many motionless frames, played at a certain speed (for example, 16 frames per second). Continuous playback of the frames makes illusion due to visual afterimage that you mistake it for the work of action. To obtain the frames of action, there is subtle difference between every frame. The production of frames is commonly drawing on papers or Celluloid; additionally, there are clay, models, puppets, sand painting, and so on. Thanks to advanced computer technologies, now we can use computer animation software to directly draw animation on the computer. Or, the method of computer processing can be applied during the animation production. Both these ways have been already commonly used in the production of commercial animation. There are Two- and Three – dimensional animation with extraordinary skills; however, they have two things in common: 1. The images of animation are produced to films or video tapes frame by frame; 2. The illusion of "Action" from the images, not originally being there, actually has been created and recorded by a video camera [13]. The animation is not the arts of "Moving Paintings", but the arts of "Animated Action" [14]. Therefore, the future animation teaching should guide students to elaborate diverse imagination to make great dramas with particular depiction of characters, and provide infinite enjoyment in visual sense, more vividly and lively.

D. Students majoring in Study Area of Design from Vocational and Technological Colleges and Universities

Vocational and Technological Colleges and Universities are organized in a form of college league by Universities of Technology, Institutes of Technology and Colleges in Taiwan. The Study Area of Design from those Vocational and Technological Colleges and Universities is a cluster of subject categories in conformity with the rules by the Minister of Education including the departments of Industrial Design, Commercial Design, Visual Communication Design, Cultural Vocation Development, Multimedia Design, Interior Design, Fine Arts, Communication Arts, Animation & Games Design, Multimedia Animation, Television & Film and Animation, the Animation Section of Department of Information Management, Architecture, Architecture and Interior Design, Fashion Design, and so on [15]. The study discusses the performance of animation imagination among the students who major in Study Area of Design and Departments of Animation from Vocational and Technological Colleges and Universities in order to explore and analyze the established animation courses of these departments of Multimedia Design, Animation & Games Design, Television & Film and Animation, the Animation Section of Department of Information Management, Communication Arts and Multimedia Animation.

IV. Research Methods and Steps

A. Research Methods

The study first adopts literature analyses of animation and imagination to explore the relationship between learning content of animation imagination, properties and influence. Next, a Survey Research will be adopted to develop the Rating Scale of Animation Imagination according to learning content of animation imagination, including Rating Scales of Fictions, Themes, Technical Design and Value Probability. Three hundred students who major in Study Area of Design, Departments of Animation, Television & Film and Animation, Vocational and Technological Colleges and Universities will take the tests of these Rating Scales. The results of Rating Scales will be sent to Item Analysis, Factor Analysis and Reliability Analysis for the relationship between variables that can measure the Rating Scales'

reliability and effect. The data of surveyed students will be analyzed by the Statistics and Analyses of Variances to explore the performance of animation imagination among the students who major in Study Area of Design and Departments of Animation from Vocational and Technological Colleges and Universities.

B. Study Objects

The study objects are selected form daytime students from the regions of North, Middle and South Taiwan, who have ever studied animation courses with a major in Departments of Multimedia Design, Animation & Game Design, Television & Film and Animation, the Animation Section of Department of Information Management, Communication Arts, and Multimedia Animation. A Stratified Purposive Sampling Method is used to select the study objects that these Departments of Departments of Multimedia Design, Animation & Game Design, Television & Film and Animation, the Animation Section of Department of Information Management, Communication Arts, and Multimedia Animation will be stratified to different layers, considering the proportion of classes in national and private schools around North, Middle and South regions (Predetermined Number of Classes / Total Number of Classes × Total Number of Classes in the department = Department Purposive Sampling Number of Classes); therefore, the purposive samples are ten classes of 358 daytime students to take the tests of Rating Scales.

C. Research Tools

The research tools have these rating scales of Fictions, Themes, Technical Design and Value Probability as follows:

1) Rating Scale of Fictions: the content contains Sources of Motives, Fiction & Imagination and Problem Solving rating scales, which mainly test whether students can complete the process of combining and describing real events and virtual fantasy space in the animation presentation. The rating scale has compiled 20 questions to make a pre-test for students. The pre-test result will be sent to Item Analysis that you will find every question showing discrimination; three subscales respectively with the third, fourth and sixth questions will be obtained after the factor analysis; the whole rating scale has total 13 questions with a α coefficient .84 of overall internal consistency.
2) Rating Scale of Themes: the content contains Story Structure and Storyboard Design, which mainly test whether students can focus on the activity of mental awareness toward non-existent things to perform a series of illusionary design and combination that will make a psychological form surpassing externality. The rating scale has compiled 17 questions to make a pre-test for students. The pre-test result will be sent to Item Analysis that you will find every question showing discrimination; two subscales respectively with the fifth and sixth questions will be obtained after the factor analysis; the whole rating scale has total 11 questions with a α coefficient .84 of overall internal consistency.
3) Rating Scale of Technical Design: the content contains Lighting & Sound, Characters & Background and Dynamic Development, which mainly test whether students can focus on the themes to perform a series of animation design for your animated illusion. The rating scale has compiled 27 questions to make a pre-test for students. The pre-test result will be sent to Item Analysis that you will find every question showing discrimination; three subscales respectively with the fifth, fourth and third questions will be obtained after the factor analysis; the whole rating scale has total 12 questions with a α coefficient .82 of overall internal consistency.
4) Rating Scale of Value Probability: the rating scale has compiled 28 questions to make a pre-test for students, and the result will be sent to Item Analysis, Factor Analysis and Reliability Analysis. The pre-test result will be sent to Item Analysis that you will find every question showing discrimination; three subscales respectively with the seventh, sixth and second questions will be obtained after the factor analysis; the whole rating scale has total 15 questions with a α coefficient .86 of overall internal consistency.

D. Research Steps and Implement

Here are the research steps and implement processes: planning research project, collecting literature & analyzing data, Scale research and tool development, consulting scholars & professional opinions, selection of the schools to take tests, scale survey, data & statistics analyses, and writing reports.

E. Data Processing

The data collected after the pre-tests of rating scales will be sent to Item Analysis for checking the relativity between each subscale's questions and total scores. The Factor Analysis screens out some low Factor Loading and critical ratio questions to obtain a consistency factor to the original structure of scales; additionally, the Reliability Analysis can examine the internal consistency between scales' questions. The test result of animation imagination will be sent to hypothesis testing by SPSS computer statistical package, and the performance of animation imagination among the students from different animation departments will be analyzed based on statistical level of significance α=.05.

V. Results and Discussion

The following four tables, in the post hoc comparison of the form in 1 refers to the Animation Section of Department of Information Management, 2 refers to the Department of Multimedia Animation, 3 refers to the Department of Communication Arts, 4 refers to the Animation & Games Design, 5 refers to the Department of Multimedia Design 6 refers to the Department of Television & Film and Animation.

The Table I is a Summary Table of One-Way Analysis of Variance and Posteriori Comparisons to show the performance of animation imagination among students who major in Study Area of Design and different animation departments in Fictions, Problem Solving, Nature of Fiction and Sources of Motives. You can discover through this table that the students who major in Study Area of Design and

different animation departments have attained to significant difference in Fictions, Problem Solving and Nature of Fiction. Moreover, it has been discovered through Posteriori Comparisons that students from departments of Multimedia Animation, Multimedia Design and Animation Section of Department of Information Management have done a better job on Fictions of animation imagination with above-average grades among different animation departments; students from departments of Multimedia Design, Animation Section of Department of Information Management and Multimedia Animation, have done a better job on Problem Solving of animation imagination with above-average grades among different animation departments; students from departments of Multimedia Animation, have done a better job on Nature of Fiction of animation imagination with above-average grades among different animation departments.

The Table II is a Summary Table of One-Way Analysis of Variance and Posteriori Comparisons to show the performance of animation imagination among students who major in Study Area of Design and different animation departments in Themes, Storyboard Design and Story Structure. You can discover through this table that the students who major in Study Area of Design and different animation departments have attained to significant difference in Themes, Storyboard Design and Story Structure. Moreover, it has been discovered through Posteriori Comparisons that students from departments of Multimedia Animation and Multimedia Design have done a better job on Themes of animation imagination with above-average grades among different animation departments; students from departments of Multimedia Design, Multimedia Animation and Television & Film, Animation , have done a better job on Storyboard Design of animation imagination with above-average grades among different animation departments; students from departments of Multimedia Animation and Multimedia Design have done a better job on Story Structure of animation imagination with above-average grades among different animation departments.

TABLE I: SUMMARY TABLE OF ONE-WAY ANALYSIS OF VARIANCE AND POSTERIORI COMPARISONS BETWEEN THE PERFORMANCE OF ANIMATION IMAGINATION AMONG STUDENTS WHO MAJOR IN STUDY AREA OF DESIGN AND DIFFERENT DEPARTMENTS IN FICTIONS, PROBLEM SOLVING, NATURE OF FICTION AND SOURCES OF MOTIVES.

Source of Variation	Name of Level	*SS*	Degree of Freedom	*MS*	*F*	Posteriori Comparisons
Class Interval	Fictions	3.596	5	.719	3.511**	2, 5, 1＞6, 4, 3
	Problem Solving	5.248		1.360	2.717*	5, 1, 2＞6, 4, 3
	Nature of Fiction	6.518		1.304	3.591**	2＞5, 1, 6, 4, 3
	Sources of Motives	1.929		.386	1.549	
Interclass	Fictions	68.014		.205		
	Problem Solving	128.243		.386		
	Nature of Fiction	120.510		.363		
	Sources of Motives		332	.249		

$^{*}p<.05$, $^{**}p<.01$, $^{***}p<.001$

TABLE II: SUMMARY TABLE OF ONE-WAY ANALYSIS OF VARIANCE AND POSTERIORI COMPARISONS BETWEEN THE PERFORMANCE OF ANIMATION IMAGINATION AMONG STUDENTS WHO MAJOR IN STUDY AREA OF DESIGN AND DIFFERENT DEPARTMENTS IN THEMES, STORYBOARD DESIGN AND STORY STRUCTURE.

Source of Variation	Name of Level	*SS*	Degree of Freedom	*MS*	*F*	Posteriori Comparisons
Class Interval	Themes	5.357	5	1.071	5.105***	2, 5＞6, 1, 3, 4
	Storyboard Design	6.924		1.385	5.599***	2, 5, 6＞1＞3＞4
	Story Structure	3.794		.759	2.714*	2, 5＞6, 1, 3, 4
Interclass	Themes	69.263		.210		
	Storyboard Design	81.878		.247		
	Story Structure	92.565	331	.280		

$^{*}p<.05$, $^{**}p<.01$, $^{***}p<.001$

The Table III is a Summary Table of One-Way Analysis of Variance and Posteriori Comparisons to show the performance of animation imagination among students who major in Study Area of Design and different animation departments in Technical Design, Dynamic Development, Lighting & Sound and Characters & Background. You can discover through this table that the students who major in Study Area of Design and different animation departments have attained to significant difference in Technical Design, Dynamic Development, Lighting & Sound and Characters & Background. Moreover, it has been discovered through Posteriori Comparisons that students from departments of Multimedia Animation, Multimedia Design and Television & Film, Animation have done a better job on Technical Design of animation imagination with above-average grades among different animation departments; students from departments of Multimedia Design, Multimedia Animation and Television & Film, Animation , have done a better job on Dynamic Development of animation imagination with above-average grades among different animation departments; students from departments of Television & Film, Animation , Multimedia Animation and Multimedia Design, Animation Section of Department of Information Management have done a better job on Lighting & Sound of animation imagination with above-average grades among different animation departments; and students from departments of Multimedia Animation, Animation Section of Department of Information Management, and Multimedia Design have done a better job on Characters & Background of animation imagination with above-average grades among different animation departments.

The Table Ⅳ is a Summary Table of One-Way Analysis

of Variance and Posteriori Comparisons to show the performance of animation imagination among students who major in Study Area of Design and different animation departments in Value Probability, Value Orientation, Self Value and Value Establishment. You can discover through this table that the students who major in Study Area of Design and different animation departments have attained to significant difference in Self Value. Moreover, it has been discovered through Posteriori Comparisons that students from departments of Multimedia Design and Multimedia Animation have done a better job on animation imagination with above-average grades among different animation departments.

TABLE III: SUMMARY TABLE OF ONE-WAY ANALYSIS OF VARIANCE AND POSTERIORI COMPARISONS BETWEEN THE PERFORMANCE OF ANIMATION IMAGINATION AMONG STUDENTS WHO MAJOR IN STUDY AREA OF DESIGN AND DIFFERENT DEPARTMENTS IN TECHNICAL DESIGN, DYNAMIC DEVELOPMENT, LIGHTING & SOUND AND CHARACTERS & BACKGROUND.

Source of Variation	Name of Level	*SS*	Degree of Freedom	*MS*	*F*	Posteriori Comparisons
Class Interval	Technical Design	4.559	5	.912	4.341**	2, 5, 6＞1, 3, 4
	Dynamic Development	5.160		1.032	3.657**	2, 5, 6＞3, 1, 4
	Lighting & Sound	4.566		.913	2.349*	6, 5, 2＞3, 1, 4
	Characters & Background	6.291		1.258	3.609**	2, 1, 5＞6, 4, 3
Interclass	Technical Design	69.733		.210		
	Dynamic Development	93.686		.282		
	Lighting & Sound	129.053		.389		
	Characters & Background	115.730	332	.349		

*p<.05, **p<.01, ***p<.001

TABLE Ⅳ: SUMMARY TABLE OF ONE-WAY ANALYSIS OF VARIANCE AND POSTERIORI COMPARISONS BETWEEN THE PERFORMANCE OF ANIMATION IMAGINATION AMONG STUDENTS WHO MAJOR IN STUDY AREA OF DESIGN AND DIFFERENT DEPARTMENTS IN VALUE PROBABILITY, VALUE ORIENTATION, SELF VALUE AND VALUE ESTABLISHMENT.

Source of Variation	Name of Level	*SS*	Degree of Freedom	*MS*	*F*	Posteriori Comparisons
Class Interval	Value Probability	1.565	5	313	1.405	
	Value Orientation	3.145		.629	1.666	
	Self Value	4.587		.917	3.265**	5, 2＞1, 6, 4, 3
	Value Establishment	1.020		.204	.583	
Interclass	Value Probability	73.935		.223		
	Value Orientation	125.335		.378		
	Self Value	93.295		.281		
	Value Establishment	116.176	332	.350		

*p<.05, **p<.01, ***p<.001

VI. CONCLUSION

The purpose of this study is to explore the "The Real Performance of Animation Imagination among Students Who Major in Study Area of Design and Departments of Animation from Vocational and Technological Colleges and Universities", and then, we survey the students who major in Study Area of Design, Departments of Animation from Vocational and Technological Colleges and Universities, and analyze their performance of animation imagination. The research result has been found: students from departments of Multimedia Animation and Multimedia Design have achieved better performance of animation imagination with above-average grades among other departments. Students from departments of Multimedia Animation, Multimedia Design and Animation Section of Department of Information Management have done a better job on Fictions of animation imagination with above-average grades among other departments of animation; students from department of Multimedia Animation, Multimedia Design and Departments of Animation, Television & Film and Animation have done a better job on Technical Design of animation imagination with above-average grades among other departments of animation; students from department of Multimedia Animation and Multimedia Design have done a better job on Possibility of Value of animation imagination to show higher performance of Self-Value with above-average grades among other departments of animation.

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