

E-Learning Platform of STEAM Aesthetic Course Materials Based on User Experience

Cheng Hung Wang
Department of Crafts and Creative Design
National University of Kaohsiung
Kaohsiung, Taiwan
wang101@nuk.edu.tw

Ting Ya Wang
Department of Crafts and Creative Design
National University of Kaohsiung
Kaohsiung, Taiwan
pg19918022@gmail.com

Abstract— With the popularity of the Internet, lots of information is provided online, and the type of e-learning is becoming more multivariate. In order to enhance the use intention and learning performance, interface design not only has to the content, but also considers the user's behavior. Users' prior knowledge or past experience will also affect their feeling and effectiveness as they are using. We integrated the concept of Kolb's experience learning circle into this e-learning platform, supplemented by modern interface design, and take usability and user experience as an evaluation consideration to plan and design this e-learning platform. Therefore, this study aims to explore the usability and user experience of users on this platform. In order to reduce the threshold of interdisciplinary learning and to improve learners' use intention and learning performance. The results of this study can be reference for planning and design of STEAM learning website, or interdisciplinary learning materials.

Keywords— *STEAM Education, Usability, User Experience, Experiential learning, Aesthetic Experience, E-learning*

I. INTRODUCTION & BACKGROUND

With the advancement of network technology and the popularization of global information, the Internet has penetrated into various fields of society, and learning behavior has also become an electronic process. According to data from Taiwan Network Information center (TWNIC), as of June 2017, the number of Internet users in Taiwan has been 18.79 million, internet usage rate has reached 80%, and continuing steady growth year by year. People becomes relying on Internet, whether use to information acquisition behavior or others, through the Internet as a medium. When learning is no longer limited to classroom, online learning spaces can also provide richer teaching resources [1]. From early computer assisted learning to e-learning to digital game-based learning, these learning methods are supported by different technologies and have different effects [2]. Most e-learning which has highly interactive is often done by improving learners' motivation, interest, attitudes, or social interactions rather than learning achievement or knowledge acquisition [3].

Learning is a process from perception to concept formation. Perception is the ability to accept sensory impressions from the environment and prior knowledge, so the learner's feelings, feelings, thinking and concept development are closely related. Thinking and feeling are usually cultivated together [4]. Cognitive style affects person's ability to process, think, solve problems, and also affects individual learning directly or indirectly.

Traditional education divides the curriculum into disciplines, and independent each other. It is not easy for learners to find connections between them. It is not easy for learners to find connections between them, and they are unable to fully understand knowledge, leading to learning fragmentation [5]. In the case of art education, it is classified as electives in the past, but life and industries cannot be separated from aesthetics. As far as visual experience and aesthetic experience, when people begin to accept the message from world, their visual experience and aesthetic experience start to accumulate, and constitute cognitions, feelings and emotions of things. STEAM Education aims to integrate knowledge in all areas, to guide students to develop their knowledge and skills, and to solve real-world problems. The main features of STEAM Education include: interdisciplinary, fun, experiential, collaborative, design, etc. [6], and complement each other with interactivity of e-learning.

Therefore, STEAM Education focuses on interdisciplinary experiential learning and application, while interactivity is an indispensable factor in e-learning. This is really different from the one-way, single-field teaching in the past. Learners gain feeling and knowledge through the process of operation and experience, forming their own experience and serving as the basis for future solutions. As a consequence, how to implement interdisciplinary education through interactive digital learning materials and improve learning effect effectively is an issue worthy of discussion.

II. LITERATURE REVIEW

A. User Experience (UX)

According to ISO's definition of user experience, user experience is a person's perception and response to the use or anticipation of a product, system, or service, including users' emotional performance, beliefs, preferences, cognition, physical/psychological reactions, behavior and achievements (ISO-9241-210, 2010). In the past, many scholars also put forward different views on user experience. [7] believes that user experience is the final result of user interface design, with the purpose to meet customers' needs, and pay attention to the experience of their using process. [8] presented that user experience is the users' internal conditions (promotions, expectations, needs, motivations, emotions, etc.), feature of product or system design (complexity, purpose, availability, functionality, etc.), and the result of interaction with the current situation or environment. The recent research on user experience and design issues has an increasing trend. Interactivity is the

core of user experience, and also can be one of experiences, including integrity, subjectivity, emotion, cognition and time [9].

[10] summarized the past literature of user experience. In order to the goal of quickly assess user experience, using a simple and directly method to investigate user perception, impression, and attitude. The original version of the User Experience Questionnaire (UEQ) was resulted from 153 usability experts and they reduced UX-related items from 200 to 26 which contains six facets: Attractiveness is pure valence, and Perspicuity, Efficiency, and Dependability are pragmatic quality. Stimulation and Novelty are hedonic qualities. [11] adjusted the version to short version after receiving feedback and suggestion. In order to reduce time of filling, proportion of invalid questionnaires and increase intention of filling. Short version only retains 8 items, which focuses on pragmatic quality and hedonic quality. This study aims to explore the user experience and learning effect in learning process. Therefore, the user experience part of questionnaire is based on short version, and takes results as reference for assessing establishment of this e-learning platform.

B. Information Processing & Experiential Learning

The information processing theory used in the information processing theory is organized as follows: (1) Learners play an active and constructive role in the learning process. (2) Have a higher level of cognitive process. (3) Students' prior knowledge is important. (4) Learning is not only the construction of concepts but also the change of cognitive structure [11] [12] [13]. [14] believes that it is necessary to be connected with individuals' mind to become knowledge. The information perceived by the senses is built on the individual's prior knowledge, beliefs, and rationality [15], forming mental structure based on previous experience. After receiving new information, the prior knowledge will be constructed and reorganized. [15]. In particular, the visual symbol system is an abstraction of spatial nature. It tends to have individual thinking but has integrated characteristics, specific appearance and conveys multiple concepts at the same time. It can give learners a more intuitive and exploratory perception.

Experience is also an important source of learning process [16]. Learning process and planning course are related to the learning experience established by students in the past. [17] considered that education begins with experience and emphasizes two characteristics: continuity and interaction. Continuity is the transition of experience from the past to the present, and then to the future; Interaction is the result of interactions between events and the environment at the time. The main points based on experiential learning is how to make possible to interest learning, such as creation of atmosphere, suitable course materials, and prior experience of learners [18].

Piaget, and Lewin's field theory originated Kolb's Theory of Experiential Learning in Philosophy of Dewey, cognitive development. Kolb's Learning Cycle includes four elements: Concrete experience, Observation & reflection, forming abstract concepts, and Testing in new situations (Fig. 1).

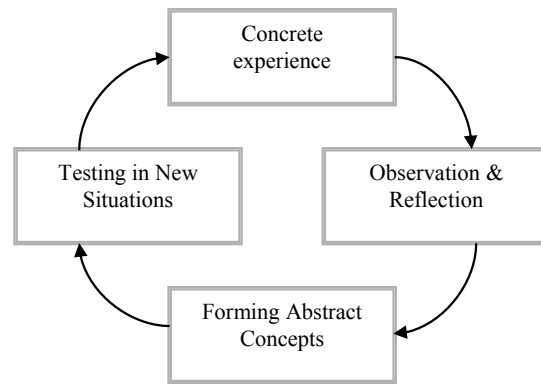


Fig. 1. Kolb's Learning Cycle.

Experiential learning is based on experience, a continuous process rather than result. It needs to adapt and solve various problems in the process, and create new knowledge through the interaction between individuals and the environment. [19] also mentioned that memory of learning will be different, depending on the situation of information processing. Learners can get more impression through the participation. This study explains that learners can use perception and experience as the basis of learning, restructuring their knowledge after participating in the experiment when they received new messages. We try to reduce the threshold for interdisciplinary learning and promote their learning performance.

C. Aesthetic Experience

In the past literature, 'Art' and 'Aesthetics' are often had close connection, sometimes it could be used interactively. Although some concepts overlap, they are not exactly the same [20]. [21] proposed a model of aesthetic appreciation and aesthetic judgments which is mainly discusses the internal processing of the information received by the perceiver, and it will affect the aesthetic experience, related to the way perception, knowledge, familiarity, expertise, style and content. The aesthetic experience doesn't happen at the moment when the information is received, but before actual perception [22].

[23] have indicated the composition of aesthetic experience: The external stimuli (artwork) are processed through perceptual coding. Some of them become memories, or directly transformed into perceptual aesthetics and cognitive aesthetics. They are affected by the environment and the adjustment of emotions in these processes, and becomes to aesthetic experience lastly.

According to the above, aesthetic experience and user experience also a more subjective sense, but not only a sensation. There are three main aspects of giving quality to aesthetic experience: (1) Evaluative dimension (2) Phenomenological or affective dimension, related to the subjective feelings and tastes of the recipients and cause their concern; (3) Semantic dimension. In general, some aesthetic experiences fundamentally explore the perception and evaluation of the recipient, while others are related to the affective or semantic aspects of aesthetic experience.

This study takes the semantic classification of aesthetic experience into account and uses semantics as experimental options. Through the interactive process of choosing

semantic tags, learners can constitute the user experience and have enhance impression and cognition of aesthetic appreciation, breaking through the traditional education to promote its learning effectiveness.

III. METHODS

A. Research Framework

“A” in STEAM education represents “Art”. Art is not an independent discipline, but an indispensable part of interdisciplinary learning. Most of the aesthetic education begins with appreciation. The explanation about the painting is not whether the speaker is from art department, but whether perspective of the listener [24]. Knowledge can't be achieved in one day, and so is aesthetic experience. In Taiwan, appreciation of Western famous paintings has already appeared in the education materials of compulsory education. There are not many people who truly understand the style and connotation of these paintings, let alone promote the learning performance of aesthetic education through paintings.

This study is intended to explore the learners' user experience in art appreciation. Using a practical experience learning process to enhance their impression and what their see before, to link prior experiences (observation and reflection), get to know more knowledge, absorb the experience from themselves or others (summarizing experience), and use these experiences to solve the problem in the end (practical application) [25]. According to this learning process, whether it is better to promote the learning performance in art department, the research framework is as Fig. 2.

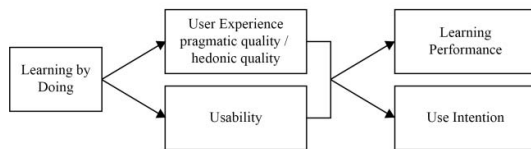


Fig. 2. Research Framework

B. Instructional design of e-learning platform

This study based on Kolb's theory of experiential learning, learners can learn art appreciation and color application through the process of using this e-learning platform, combines personal perception with past experience to select appropriate semantics, and presents the painting's detail information in the end as a stimulation of new knowledge. It makes learners more impressed and uses this aesthetic experience in real life.

1. Name of E-learning platform: Learning color application from the world famous painting.
2. Instruction Objective:
 - Make it easy for learners to learn art appreciation.
 - Develop the ability to color applications.
 - Improve the learning performance of Color Psychology.
 - Implement the aesthetics of living.
3. Theoretical Foundations and key points of teaching:

According to Kolb's theory of experiential learning, learners' behavioral performance has four stages of learning: learning from feeling, learning by watching and listening, learning by thinking and learning by doing. Learners will learn the skills of basic art appreciation through operation process, and the operating procedures are compared with the theory of experiential learning, as shown in Table I.

TABLE I. OPERATING PROCEDURES - THEORY OF EXPERIENTIAL LEARNING


Learning process	Theoretical explanation	Operating procedures
Learning from feeling	Inspire the learner's motivation with actual specific feelings and experience.	Display few world famous paintings, and let learners choose a painting as the object of analysis, which is more sensational or favorite.
Learning by watching and listening	Comprehensive organizing knowledge through behavioral observations (senses, thoughts, emotions, behaviors, and intentions inspired by experience).	Make painting becomes pixelated, from image to color blocks. After compares pixelated painting with the original one, learners can choose the semantic tag which is more suitable.
Learning by thinking	Use the information to learn which are presented by the analysis through rational and logical thinking, enhancing experience by internalization of knowledge.	Show the original appearance, caption, and main color of the painting. Learners can analyze and construct knowledge based on their own choice and the information, which appears in this page.
Learning by doing	After gaining knowledge and experience, learners can put them into real action and solve real-world problems.	Learners can use the results of the appreciation to match their own style or their favorite color matching.

C. Interface design of e-learning platform

Interface design and content of this e-learning platform are as follows (TABLE II):

TABLE II. INTERFACE DESIGN AND CONTENT OF E-LEARNING PLATFORM

Interface	Description
	Index <ol style="list-style-type: none"> 1. Learners can choose the project, which they want to know. 2. Display the author and name of the painting when the mouse hovers.
	Operation page <ol style="list-style-type: none"> 1. Color analysis of famous paintings 2. Main color matching 3. Learners can choose adjectives, which are fit for the picture.

Description page	
	1. Appreciation of famous paintings
	2. Adjectives and color matching
	3. Color knowledge

D. System Usability Scale (SUS) & User Experience Questionnaire (UEQ)

The interface for this platform will be used as a preliminary evaluation questionnaire through the System Usability Scale (SUS) and User Experience Questionnaire (UEQ). Usability includes the design and functionality of the website, and well developed website content and functionality will increase consumer satisfaction and user feedback [26] [27] [28]. SUS has been widely used in standardized questionnaires for testing product systems or website interfaces, and it also has objectivity, universality, repeatability, and quantifiable. UEQ has been proposed by [11] can assess the user experience, including pragmatic quality and hedonic quality. This study will combine these two scales to quickly and effectively evaluate the construction of e-learning platform.

SUS has a total of 10 questions, the Cronbach's $\alpha=0.823$ for question; and 8 questions for UEQ, the Cronbach's $\alpha=0.768$ for the question. The results show that the Cronbach's α values of the two scales are all higher than 0.7, so the reliability of these two scales has reached an acceptable range.

IV. ANALYZE

This study uses "UEQ" and "SUS" to evaluate usability and user experience of the e-learning platform. In order to understand users' performance on these two scales, taking analysis results of T-test and correlation as a reference. The total number of samples is 60. After using the experimental platform, users completed the questionnaire, which includes basic information, past experience of the e-learning platform and experience of experimental platform.

A. One-Sample T-Test of Usability

In T-test analysis of usability, the verification value is 68. Significance $P = 0.000 < 0.05$, the null hypothesis is invalid, in 95% confidence level, there is a significant difference between usability and average, the confidence interval is positive without 0. The usability of this platform is significantly higher than the average of SUS's standard (TABLE III).

TABLE III. SINGLE SAMPLE T-TEST – USABILITY

Verifications = 68						
	t	df	p	MD	95% Confidence Interval	
					Lower Limit	Upper Limit
Usability	4.217	59	.000*	8.65500	4.5484	12.7616

a. Note: *P<0.05

B. One-Sample T-Test of User Experience

In T-test analysis of user experience, the verification value of pragmatic quality is 1.07. Significance $P=0.004 < 0.05$, the null hypothesis is invalid, in 95% confidence level,

there is a significant difference between pragmatic quality and UEQ's standard, the confidence interval is positive without 0. The pragmatic quality of this platform is significantly higher than the average of UEQ's standard. In terms of hedonic quality, the verification value is 0.97. Significance $P= P=0.317 > 0.05$, the null hypothesis is valid, in 95% confidence level; there is no significant difference between hedonic quality and UEQ's standard (TABLE IV.).

TABLE IV. SINGLE SAMPLE T-TEST – USER EXPERIENCE

Verifications = 1.07						
	t	df	p	MD	95% Confidence Interval	
					Lower Limit	Upper Limit
Pragmatic Quality	2.965	59	0.004*	0.40917	0.1330	0.6853
Verifications = 0.97						
Hedonic Quality	1.008	59	0.317	0.12583	-0.1239	0.3756

b. Note: *P<0.05

C. Independent-Sample T-test of Gender to Usability

According to the analysis results in TABLE V., $t= -0.109$, significance $P=0.913>0.05$ the null hypothesis is invalid, and there is no significant difference in the gender of the user and usability. Therefore, usability of the platform has no significant difference with the gender of the user.

TABLE V. T-TEST FOR USABILITY – BY GENDER

IV	N	Mean	MD	t	p
Gender				-0.109	0.913
Male	30	76.8810	17.44008		
Female	30	76.4290	14.48674		

c. Note: *P<0.05

D. Independent-Sample T-test of Gender to User Experience

According to the analysis results in TABLE VI and TABLE VII., $t= -0.210$, significance $P=0.835>0.05$, the null hypothesis is invalid, and there is no significant difference in the gender of the user and user experience. Therefore, user experience of the platform has no significant difference with the gender of the user.

TABLE VI. T-TEST FOR PRAGMATIC QUALITY – BY GENDER

IV	N	Mean	MD	t	p
Gender				-0.210	0.835
Male	30	1.5083	1.20431		
Female	30	1.4500	0.93403		

d. Note: *P<0.05

TABLE VII. T-TEST FOR HEDONIC QUALITY – BY GENDER

IV	N	Mean	MD	t	p
Gender				-0.698	0.488
Male	30	1.1833	0.96027		
Female	30	1.0083	0.98147		

e. Note: *P<0.05

E. Independent-Sample T-test of Departments to Usability

According to the analysis results in TABLE VIII., $t= -1.441$, significance $P=0.155>0.05$, the null hypothesis is invalid, and there is no significant difference in the departments of the user and usability. Therefore, usability of

the platform has no significant difference with the departments of the user.

TABLE VIII. T-TEST FOR USABILITY – BY DEPARTMENT

IV	N	Mean	MD	t	p
Department				-1.441	0.155
Art Related	19	72.3495	.93403		
Non-Art Related	41	78.6502	1.20431		

^f Note: *P<0.05

F. Independent-Sample T-test of Departments to User Experience

According to the analysis results in TABLE IX and TABLE X., $t = -0.935$, significance $P = 0.354 > 0.05$, the null hypothesis is invalid, and there is no significant difference in the departments of the user and user experience. Therefore, user experience of the platform has no significant difference with the departments of the user.

TABLE IX. T-TEST FOR PRAGMATIC QUALITY – BY DEPARTMENTS

IV	N	Mean	MD	t	p
Department				-0.935	0.354
Art Related	19	1.2895	1.02491		
Non-Art Related	41	1.5671	1.08976		

^g Note: *P<0.05

TABLE X. T-TEST FOR HEDONIC QUALITY – BY DEPARTMENTS

IV	N	Mean	MD	t	p
Department				-0.091	0.928
Art Related	19	1.0789	0.82096		
Non-Art Related	41	1.1037	1.03679		

^h Note: *P<0.05

G. Correlation analysis of Usability and User Experience

In the results of this platform, significance of usability and user experience is $P = 0.000 < 0.05$, and $0.3 < r < 0.7$. It shows moderate positive correlation between the usability and user experience; In terms of user experience, significance of pragmatic quality and hedonic quality is $P = 0.027 < 0.05$, and $0.1 < r < 0.3$. It shows modest positive correlation between pragmatic and hedonic quality, and the correlation coefficients are organized as shown in TABLE XI.

TABLE XI. COMPARISON OF USABILITY AND USER EXPERIENCE

		Usability	Pragmatic Quality	Hedonic Quality
Usability	Pearson (r)	1	0.638**	0.233
	Significance		0.000	0.074
Pragmatic Quality	Pearson (r)	0.638**	1	0.285*
	Significance	0.000		0.027
Hedonic Quality	Pearson (r)	0.233	0.285*	1
	Significance	0.074	0.027	

ⁱ Note: *p<0.05, ** p<0.01, ***p<0.001

V. CONCLUSION

This study explores two aspects of system interface usability and user experience as the basis for e-learning platform interface design and evaluation. In this way, e-learning platform with good usability and user experience is designed to enhance learners' interest and learning

performance. Through the analysis of usability and user experience, the results obtained are as follows:

A. This learning platform has good usability and pragmatic quality.

According to the analysis results of the T test, the interface of this platform is easy to use, and the pragmatic quality of the user experience has well evaluated, but in terms of hedonic quality is no significant.

B. This learning platform is suitable for learners of different genders.

The usability and user experience of this platform are not significantly different for users' gender, it shows that this platform is suitable for all users of different genders.

C. This learning platform is suitable for learners of different departments.

The usability and user experience of the interface of this platform are not significantly different whether the user is an art-related department or not, it shows that this platform is suitable for users in different departments.

D. The better the system's ease of use, the better the user experience; pragmatic quality and hedonic quality affect each other.

According to Pearson correlation analysis, the system usability is moderately positively correlated with the practical value of user experience. The practical value of user experience is also positively correlated with the enjoyment value. This means that both usability and user experience affect each other. No matter what is improved, the usability of the learning platform can be improved.

REFERENCES

- [1] I. H. Chen, "A Study of Strategies for Developing the Online Learning Community", Cheng Shiu General Education Journal, vol. 10, pp.147 – 166, June 2013.
- [2] C. C. Chang, K. Y. Lin, "From Traditional e-Learning to Digital Game-Based Learning: Learning Performance, Flow Experience and Cognitive Load", Chinese Journal of Science Education, vol. 24, 3, pp. 221 – 248, September 2016.
- [3] Gunter, G., Kenny, R. and Vick, E., "Taking Educational Games Seriously: Using the Retain Model to Design Endogenous Fantasy into Standalone Educational Games.", Educational Technology Research and Development, vol. 55, pp. 511-532, October 2007.
- [4] L. J. Li, "Using Senses and Imagination to Extend Children's Experiences", Seanson Art Children's Education Special Issue, vol. 35, pp. 6-7, August 2011.
- [5] H. F. Huang, "Development and Thinking from Alternative Education to Experimental Education", Pulse of Education, vol. 14, June 2018.
- [6] Y. F. Gao, "Practice combined maker movement with STEAM education", Mechanics in Engineering. vol. 38, 1, pp. 74-77, March 2016.
- [7] Don Norman, Jakob Nielsen, The Definition of User Experience (UX). Retrieved from <https://www.nngroup.com/articles/definition-user-experience>, August 8, 1998
- [8] M. Hassenzahl, N. Tractinsky, "User experience - a research agenda." Behaviour & Information Technology. vol. 25, pp. 91-97, May 2006.
- [9] Theo Mahut, Carole Bouchard, Jean-François, Omhover, Carole Favart, Daniel Esquivé, "Interaction, the core of User Experience.", Design and semantics ofform and movement, vol. 2015, pp. 173-183, October 2015.
- [10] M. Schrepp, A. Hinderks, J. Thomaschewski, "Applying the User Experience Questionnaire (UEQ) in Different Evaluation Scenarios", Lecture Notes in Computer Science, Vol. 8517, pp. 383-392, June 2014.
- [11] Schrepp, Martin; Hinderks, Andreas; Thomaschewski, Jörg, "Design and Evaluation of a Short Version of the User Experience

- Questionnaire (UEQ-S)". *IJIMAI*, vol. 4, 6, pp. 103–108, December 2017.
- [12] X. R. Chang, "New trends in modern teaching methods", *Educational Review*, vol. 2, pp. 69-88, 1989.
 - [13] Robert S. Slegler, "Encoding and the development of problem solving.", In S.F. Chipman, J. W. Segal. and R. Glaser (Eds.), *Thinking and Learning Skills. Volume 2: Research and open questions*. New Jersey: Lawrence Erlbaum Associates, 161-185, 1985.
 - [14] Van Engen, H. (1953). The formation of concepts. In H. F. Fehr (Ed.), *The learning of mathematics: Its theory and practice*. Twenty-first Yearbook of the National Council of Teachers of Mathematics (pp.69-98). Washington, DC: NCTM.
 - [15] C. J. Gao, "Constructivism: Reflections on Philosophy of Science", *Journal of Education Research*, vol. 49, pp. 16-24, 1996.
 - [16] Y. X. Chang, "Relationships between the Processes of Experiential Learning and the Abilities of Technological Problem Solving of Junior High School Students," unpublished.
 - [17] Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development* (Vol. 1). Englewood Cliffs, NJ: Prentice-Hall.
 - [18] Merriam, S. B. & Caffarella R. S. (1999), *Learning in Adulthood: A comprehensive guide*. San Francisco: Jossey-Bass Inc.
 - [19] Clark, L. H., & Starr, I. S. (1986). *Secondary and middle school teaching method*. New York: Macmillan Publishing Co.
 - [20] Brieber, D., Nadal, M., Leder, H., & Rosenberg, R. (2014). Art in time and space: Context modulates the relation between art experience and viewing time. *PLoS ONE*, 9 (6), e99019. doi:10.1371/journal.pone.0099019
 - [21] Leder, H., Belke, B., Oeberst, A., & Augustin, D., "A model of aesthetic appreciation and aesthetic judgments", *British Journal of Psychology*, vol. 95, pp. 489–508, November 2004.
 - [22] Cupchik GC, Vartanian O, Crawley A, Mikulis DJ, "Viewing artworks: contributions of cognitive control and perceptual facilitation to aesthetic experience.", *Brain Cogn*, vol. 70, 1, pp. 84-91, June 2009.
 - [23] C. Redies (2015). Combining universal beauty and cultural context in a unifying model of visual aesthetic experience, *Frontiers in Human Neuroscience* 9. doi:10.3389/fnhum.2015.00218
 - [24] H. Y. Yu, "Seeing "beauty" from life: the importance of aesthetic education and aesthetics of life", Retrieved from Cheers: <http://www.cheers.com.tw/blog/blogTopic.action?id=461&nid=6240>, March 21, 2016
 - [25] M. R. Yang, "A Study of Technology Concept Learning Effect on Exploring Learning through Making Hovercraft Activity" unpublished.
 - [26] Ranganathan, C. and Shobha, G., "Key dimensions of business-to-consumer website." *Information and Management*, vol. 39, 6, pp. 457-465, May 2002.
 - [27] L. C. Schaupp, B. France, "A Conjoint Analysis of Online Consumer Satisfaction." *Journal of Electronic Commerce Research*, vol. 6, 2, pp. 95-109, January 2005.
 - [28] A. V. Hausman, J. S. Siekpe, "The effect of web interface features on consumer online purchase intentions." *Journal of Business Research*, Vol. 62, No. 1, pp. 5-13, January 2009