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RESEARCH ON 2010 WORLD EXPO ONLINE PAVILIONS GENERAL RANKINGS WITH USER EXPERIENCE

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ABSTRACT

With the development of the Internet and virtual reality technology, 3D websites are born.With Shanghai World Expo online pavilion as research subject, the weight of each indicator is calculated through the Analytic Hierarchy Process (AHP), thus constructs 3D websites quality assessment model, including emotional quality, aesthetic quality, function quality, information quality and technology quality, ten particular online pavilions were general ranked according with the expectation-perception difference of SERVQUAL model.

Keywords: *3D Websites; AHP; Shanghai World Expo Online; SERVQUAL*

1. INTRODUCTION

The Harvard Business Review ran an article titled "Welcome to the Experience Economy. " Pine and Gilmore, who wrote a book by the same name, argue that the entire history of economic progress could be captured as a progression from extracting commodities (agrarian economy), to making goods (industrial economy), to delivering services (service economy), and now, to one of staging experiences (experience economy). The article suggests characteristics of desirable experiences that draw heavily from entertainment and customer service, as well as five principles for designing such experiences: theme the experience, fulfill it in all the details, harmonize the impression with positive cues, eliminate negative cues, and mix in memorabilia[1].

With the development of the Internet and virtual reality technology, 3D websites are born, what establishes a three-dimensional virtual world on the Internet. 3D websites' application range is so wide, mainly dividing into four categories: business, education, entertainment, virtual community. Today, the experience economy is popular, the websites how to stick the user? How to give users a better experience? This is the key to the success of 3D website. This paper is organized as follow: introduction and literature review are in the first, then World Expo 2010 summary and building quality assessment model of 3D website with user experience are in the following, general ranking for ten online pavilion and conclusions are in the end.

2. LITERATURE REVIEW

Design principles connect the visual design of visualization with the viewer's perception and cognition of the underlying information the visualization is meant to convey. Identifying and formulating good design principles often requires analyzing the best hand-designed visualizations, examining prior research on the perception and cognition of visualizations, and, when necessary, conducting user studies into how visual techniques affect perception and cognition[4]. Within a marketing context, a company must find “a powerful point of differentiation through the use of aesthetics to create positive overall customer impressions that depict the multifaceted personality of the company or brand.” Substantial attention is devoted to the branding phase during which a symbol is strategically created, conveys a positioning, provides tangible value, and is most effectively managed on a daily basis [5].

With the improvement of user requirement, experience has become "wide spread, wide angle" [6], evolves into a kind of complete experience which formed during the process of users interacting with software products. As long as beauty and goodness stress the subjective valuation of a product, both were related to each other. However, the nature of goodness and beauty was found to differ. Goodness depended on both perceived usability and hedonic attributes. Especially after using the skins, perceived usability became a strong determinant of goodness. In contrast, beauty largely depended on identification;

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a hedonic attribute group, which captures the product's ability to communicate important personal, values to relevant others. Perceived usability as well as goodness was affected by experience (i.e., actual usability, usability problems), whereas hedonic attributes and beauty remained stable over time [7]. The simple way to think about what influences experience is to think about the components of a user-product interaction, and what surrounds it [8] and procedures needed by persons who are about to embark on their first qualitative research projects and who want to build theory at the substantive level. The main steps of grounded theory are as follows [9]: (1) Theoretical sampling. (2) Collecting information; (3) Coding information, and forming the concepts from information. (4) Continually comparing between data, and between conceptions and between data and conceptions. (5) Forming theoretical conceptions, and establishing the relationships between conceptions. (6) Building theory and judging it. The model of influencing factors on 3D website user experience with grounded theory is established, it includes four influencing factors in the following: Website quality, External Environmental factor, User Internal factor and Recommendation in [10] .

3. WORLD EXPO 2010 OVERVIEW

In the true sense, the first World Expo is The Great Exhibition, which was hosted in London's Hyde Park in 1851, and its theme is "World Cultural and Industrial technology". The British showed the brilliant achievements after industrial revolution in the World Expo. With a long history, World Expo through different both ages and countries, presents the new conceptions, new views, new technologies to people, which promote human development. In 2000, the Hanover World Expo, Germany, the theme is "Human, Nature, Technology". The Aichi World Expo was hosted in Japan in 2005, its theme is "Nature's Wisdom". The 2010 World Expo was hosted in Shanghai P.R.China, its theme is "Better City, Better Life".

Online pavilion should have four functions as following: (1) Promotion: To promote each province and its physical pavilion, fully using the advantages of network. (2) Navigation: To let visitors understand the province's physical pavilion intuitively, lively and generally. (3) Exhibition: To exhibit the brilliant content of physical pavilions on network realistically, using 3D technology, and extend and supply the physical pavilions by using virtual space. (4) Education: To introduce each province's technology, history, culture, development and so on by using online Expo and other lively methods and forms, thus achieve the purpose of entertaining and education.

Expo Shanghai Online is divided into three types of pavilions—A, B, C. In A pavilion, users can enter particular exhibition hall to understand the exhibitions and layout by click the mouse; in B pavilion, there is interactivity function, users can visit the hall by 3D panoramic method; in C pavilion, "visitor" can walk in the pavilion freely as first person, experience the atmosphere of true pavilion.

When entering the home page of online expo, the 3D virtual scene of Expo Park is greeted, sporadic ship shuttling on Huangpu River. The pavilions distribute on both sides of the Lupu Bridge, "one axis-four pavilions" -- World Expo axis, china pavilion, performing center, World Expo center appears impressively. The blue mascot "Haibao" warmly introduce the online pavilions to users. Users can watch the parks and pavilions from multiple angles, distance, close, head-up, overlook and so on. Online pavilion sense is very realistic, users can come in and go out the pavilion freely and watch the items on display, even they can "take up" the items to watch every detail.

4. BUILD THE QUALITY ASSESSMENT MODEL OF 3D WEBSITE

In the model of influencing factors on 3D website user experience with grounded theory (Figure 1)[8], prior experience, website quality experience and user advice determine the user experience, and the user experience expresses as the forms of positive comment and negative comment, and the website quality experience is the main factor. Thus, this study designs the 3D website quality assessment indicators system, then calculates the weights of each indicator using AHP, constructs the 3D website assessment model, finally finds the key points.

4.1. Construct Hierarchical Model

The purpose of establishing the 3D website quality assessment system's target layer is to provide an objective basis, and to reduce subjectivity and random, to reflect the 3D website's effect more generally, objectively, really. So the target layer is designed 3D website quality (Table 1).

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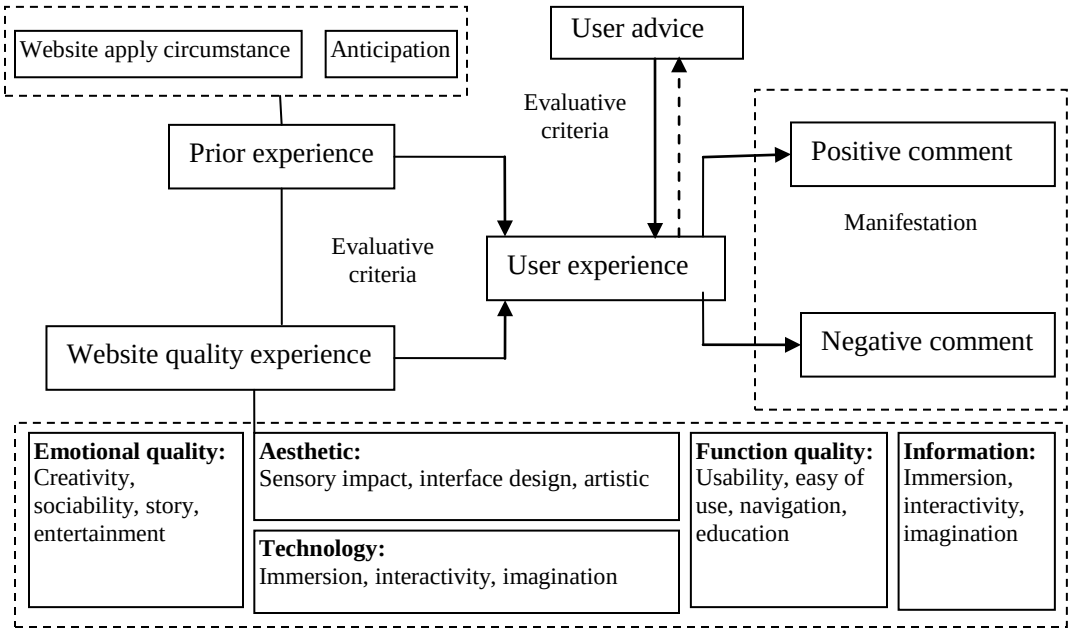

Figure 1 The Model Of Influencing Factors On Web 3D User Experience With Grounded Theory

Table 1 3D Website Quality Evaluation Indicator System

Target layer		One level index		Two level index	
3D website quality evaluation based on user experience	U	Emotional quality	U_1	Creativity	U_{11}
				Sociability	U_{12}
				Story	U_{13}
				Entertainment	U_{14}
		Aesthetic quality	U_2	Sensory impact	U_{21}
				Interface design	U_{22}
				Artistic appeal	U_{23}
		Function quality	U_3	Usability	U_{31}
				Easy of use	U_{32}
				Navigation	U_{33}
				Education	U_{34}
		Information quality	U_4	Depth and breadth	U_{41}
				Relevance	U_{42}
				Objective	U_{43}
		Technology quality	U_5	Immersion	U_{51}
				Interactivity	U_{52}
				Imagination	U_{53}

The paper construct two levels under the target layer: (1) One class index: emotional quality, user experience pays more attention to the emotional resonance when user interacting with the products. Wonderful experience may let user ignore the design defect, and affect users' behavioral intention to increase the possibility of continuing experience, and it is the import method; aesthetics quality, aesthetics determines the users' subjective experience. The user experience of 3D website is a subjective notion, the products' aesthetics produce sensory impact to user, and to pursuit beautiful thing is a way that user express his individuality.

The powerful products may not be able to attract users, and users may choose those beautiful products; function quality, function quality is the most basic and important factor to judge the website quality whether good or not. A successful website can give the users a good user experience, let users complete an experience simply and effectively; information quality, one of a website's major functions is to provide vast amounts of information. If users can access to the required

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information online efficiently, there will be a pleasant experience. So when construct the website's information, we should chose the user-centric way that user can easily understand; technology quality, the particularity of 3D website determines to consider the quality of virtual reality technology when assessing the website quality, that is to say, whether the used 3D technology smooth, detailed or not, whether the products' effects arrive at the users' anticipation or not, whether it reflects the website's technical strength. (2) Two class index: creativity, sociability, story, entertainment, sensory impact, interface design, artistic appeal, usability, easy of use, navigation, education, depth and breadth, relevance, objective, immersion, interactivity, imagination.

4.2. Judgment Comparison, Weight Calculation And Consistency Test

In order to establish a pairwise comparison matrix, the paper invited five closely related experts, they are expert groups consisted of scholars in this field, web designers and requirements analysts. We invited the experts to give their assignment to the quotas according to their own knowledge and experience, and also in accordance with the relative importance of the their previous quotas in 1-9 scale table of all level. And then we obtained the general judgment matrix by geometric average method of the five experts judgment matrices. At the same time, in order to facilitate the AHP treatment, we got the general scores by half adjust, if any score is less than 1,we got the round-off number of its reciprocal, and then got the reciprocal of the new number as the score (Table 2, Table 3, Table 4, Table 5, Table 6 and Table 7).

Table 2 Website Quality U Judgment Matrix

U	U_1	U_2	U_3	U_4	U_5	W_i
U_1	1	1	2	1	2	0.246
U_2	1	1	1	2	2	0.257
U_3	1	2	1	1/2	2	0.169
U_4	1	2	1/2	1	2	0.222
U_5	2	2	2	2	1	0.107

Note: CR = 0.04<0.1

Table 3 Emotional Quality U_1 Judgment Matrix

U_1	U_{11}	U_{12}	U_{13}	U_{14}	W_{1i}
U_{11}	1	1	2	2	0.317
U_{12}	1	1	3	3	0.389
U_{13}	1/2	1/3	1	2	0.172
U_{14}	1/2	1/3	1/2	1	0.122

Note: CR = 0.03 < 0.1.

Table 4 Aesthetic Quality U_2 Judgment Matrix

U_2	U_{21}	U_{22}	U_{23}	W_{2i}
U_{21}	1	2	1	0.413
U_{22}	1/2	1	1	0.260
U_{23}	1	1	1	0.327

Note: CR = 0.05 < 0.1.

Table 5 Function Quality U_3 Judgment Matrix

U_3	U_{11}	U_{12}	U_{13}	U_{14}	W_{3i}
U_{31}	1	1	1/2	2	0.223
U_{32}	1	1	1/2	3	0.250
U_{33}	2	2	1	2	0.418
U_{34}	1/2	1/3	1/3	1	0.110

Note: CR = 0.02 < 0.1.

Table 6 Information Quality U_4 Judgment Matrix

U_4	U_{41}	U_{42}	U_{43}	W_{4i}
U_{41}	1	2	2	0.493
U_{42}	1/2	1	2	0.311
U_{43}	1/2	1/2	1	0.327

Note: CR = 0.05 < 0.1

Table 7 Technology Quality U_5 Judgment Matrix

U_5	U_{51}	U_{52}	U_{53}	W_{5i}
U_{51}	1	1	2	0.376
U_{52}	1	1	4	0.474
U_{53}	1/2	1/4	1	0.149

Note: CR = 0.05<0.1

All judgment matrix's CR value is less than 0.1, so all judgment matrix pass the consistency test, and the results have high acceptability.

4.3. 3d Website Quality Assessment System

We get the total weight of 3D website quality assessment index system (Table 8), after calculating each index's weight for target layer.

We calculate the value of two class index's CR, 0.037<0.1, so the result is acceptable having the satisfactory coherence.

The conclusions are as follows: (1) the one class index—emotional quality (U1), aesthetic quality (U2), function quality (U3), information quality (U4), technology quality (U5), their weight scores are 0.246, 0.257, 0.169, 0.222, 0.107, so the order is U2, U1, U4, U3, U5; (2) the weight scores of two class index(U11~U53) are 0.078, 0.096, 0.042, 0.030, 0.106, 0.067, 0.084, 0.038, 0.042, 0.070, 0.018, 0.109, 0.069, 0.043, 0.040, 0.051, 0.016, the order is depth and breadth, sensory impact, sociability, artistic appeal, creativity, navigation, relevance, interface design, interactivity, objective,

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story, easy of use, immersion, usability, entertainment, education, imagination, while story and easy of use have the same score.

users' pursuit of aesthetics and fashion. The website also could add

Table 8 The Total Weight Of 3D Website Assessment Model Based On User Experience

3D website assessment indicators based on user experience	Emotional quality U_1 0.246	Aesthetic quality U_2 0.257	Function quality U_3 0.169	Information quality U_4 0.222	Technology quality U_5 0.107	Weight
Creativity U_{11}	0.317					0.078
Sociability U_{12}	0.389					0.096
Story U_{13}	0.172					0.042
Entertainment U_{14}	0.122					0.030
Sensory impact U_{21}		0.413				0.106
Interface design U_{22}		0.260				0.067
Artistic appeal U_{23}		0.327				0.084
Usability U_{31}			0.223			0.038
Easy of use U_{32}			0.250			0.042
Navigation U_{33}			0.418			0.070
Education U_{34}			0.110			0.018
Depth and breadth U_{41}				0.493		0.109
Relevance U_{42}				0.311		0.069
Objective U_{43}				0.196		0.043
Immersion U_{51}					0.376	0.040
Interactivity U_{52}					0.474	0.051
Imagination U_{53}					0.149	0.016

4.4. Countermeasures For Building 3d Website

By the above calculation, we find that emotional quality, aesthetic quality, function quality, information quality, technology quality all affect the 3D website's quality. This study identifies the key experience point of 3D website, by the Analytic Hierarchy Process (AHP) method. So, there are three aspects to improve the 3D website' quality and increase users' satisfaction from the perspective of user experience.

The impaction of aesthetic perception for users has been produced before using the site, good visual and auditory experience, the distinctive and groovy design firmly attract users and strongly excite their senses. It stresses the website's harmony and fun that integrate a variety of audio and video technology, so it can grasp the users' vision and move the users' hearing. Therefore, it should pay more attention to the proportion between the picture and text to balance user's visual effect. Appropriate color, considering the background color, element color and so on, the website could use a color as basic color to maintain the consistency, for example online pavilion website uses blue as main color giving people a deep impression. Concordant interface design, the website could choose some fine, innovative, creative and imaginative elements to emphasize the website's atmosphere and meet some beautiful background music to create artistic and set some entertainment items to relax users' mood and rich their amateur lives when browsing the website.

Users' emotions will affect their behavior. Traditional view thinks a good website can effectively and efficiently use, but this view ignores users' emotional needs. The popularity of SNS site is questioned on this point. Users want to be able to share their feelings with surrounding virtual visitors or watch the pavilion with their family and friends on the experience the process, so website should pay more attention on user' need on social aspects. The website also should immerse users in an exciting or pleasant story which to relax mood. So 3D website could set some community items and puzzle games to enhance site's value, to create social and entertainment platform which imitate real situation to rich users' lives making love the website at first sight.

In the requirements analysis phase, the website builder should do adequate user reach, classify and organize information from users' perspective and keep the logical relationship between information classes is clear and intuitive, avoid repeated, redundant phenomenon. In information construction phase, the website builder should grasp information's depth and breadth, relevance, target, and should express clearly the information,

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avoid ambiguity to let users understand the purpose of the website. 3D website is different from traditional 2D website, the information deliver ways are not limited to text and pictures can also be beautifully virtual scene and virtual objects to express to users, whatever they must let users understand, and easily get. For instance, ShangHai World Expo official website use "Treasure" as a tour guide to explain the various pavilions.

5. GENERAL RANKING FOR TEN ONLINE PAVILIONS

This section ranks ten online expo pavilions by using the evaluation model of 3D website quality based on user experience, and the operation flow is showed in Figure 2.

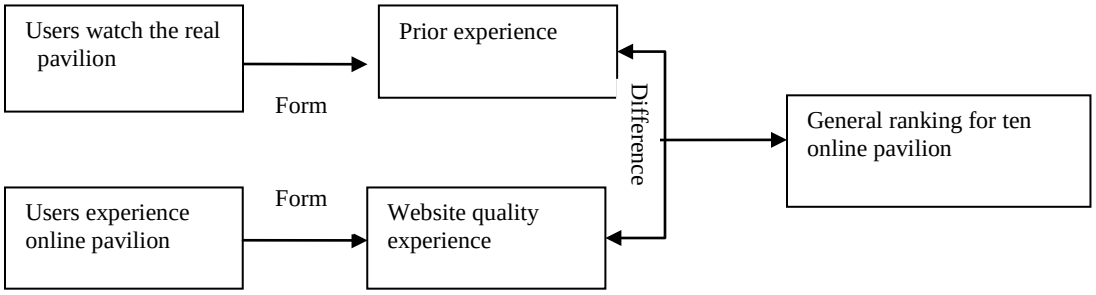

Figure 2 The Operational Process Of General Ranking

For website developers, the factor of prior experience is not easy to control, so in this study, we deal with it as follows: fist, let the users in the same operating environment finish the study to reduce the assessment impact from the factor of web application environment; second, we use the idea of SERQVUAL model to assess the impact of anticipation factor for the final user experience by calculating the gap between users' anticipation and perception; last, we calculate the total scores after browse the ten websites and score them combining with 3D website evaluation model, and we get the assessment result of 3D website quality based on user experience. We think the user suggestion is belong to scope of operation and maintenance for developer, so we do not consider it in this assessment.

5.1. THE METHOD OF SERVQUAL

We rank the ten online expo pavilions by using the 3D website quality evaluation model and the idea of SERQVUAL model to find the gap between the real expo pavilions in the users; eyes and the virtual 3D pavilion online.

SERVQUAL has three measurement methods: gap analysis, linear regression and joint analysis. We use weighted gap analysis, first, we collect the data of user anticipation and perception experience, and then according to the mentioned index weights, calculate the gap between anticipation and perception.

The weighted gap analysis principle used in this paper is as followed:

SERVQUAL quality (SQ) = perception score (PS) – expectation score (ES)

(1) If PS > ES, then SQ > 0, the web site quality is beyond the users' exception, and users are very satisfied with it.

(2) If PS = ES, then SQ = 0, the web site quality is equal to users' exception, and users are basically satisfied with it.

(3) If PS < ES, then SQ < 0, the web site quality is under the users' exception ,and users are not satisfied with it.

The weighted website evaluation formula is:

$$SQ = \sum_{i=1}^{s} u_i \sum_{j=1}^{m_i} w_{ij} (\overline{P_j} - \overline{E_j})$$

Formula description:

—SQ represents the value of the overall perceived quality of the assessment model;

— $\overline{P_j}$ represents the jth indicator's the average of user perception;

— $\overline{E_j}$ represents the jth indicator's the average of user exception;

— w_{ij} represents the weight of third level index of j relates to the second level index of i;

— u_i represents the weight of ith second level index;

— m_i represents the number of third index;

—s represents the number of second index.

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5.2. THE RANKING PROCESS OF ONLINE PAVILION

To verify the established 3D website quality evaluation model, we chose ten representative online pavilion to study, they are UAE, Poland, Russian, France, Canada, Switzerland, Spain, Italian, UK, China. We rank the ten world expo online pavilions to give some suggestions for building 3D website by calculating the difference between users' perception and exception for the 3D website's quality.

(2) First, let them watch the DVD: Design for World Expo. We chose the DVD to instead, because students do not have the chance watch the real pavilions. After watching the entitative pavilion from UAE, Poland, Russian, France, Canada, Switzerland, Spain, Italian, UK, China, the assessors need to score the corresponding index, according to the users' exception, mark √ at fit palace. 1-7 represents form very unimportant to very important, the evaluated (Appentix A)

Table 9 The Scores Of Each Pavilion

	Anticipation										Perception									
	UAE	Poland	Russia	France	Canada	Switzerland	Spain	Italy	Britain	China	UAE	Poland	Russia	France	Canada	Switzerland	Spain	Italy	Britain	China
1	34	31	34	34	30	31	30	31	31	31	31	26	31	31	28	29	27	30	21	31
2	26	26	29	25	26	25	25	26	25	27	21	17	21	22	23	22	22	20	21	24
3	28	24	27	26	26	27	26	27	27	24	25	23	25	26	26	31	24	24	23	27
4	30	29	31	28	30	28	25	27	23	27	25	23	26	24	26	23	22	23	21	31
5	29	29	31	30	29	29	29	30	29	30	30	22	32	29	34	25	29	28	28	27
6	33	31	33	33	31	31	29	30	30	31	31	28	31	33	32	30	31	30	30	31
7	31	31	32	32	30	33	30	33	32	29	30	26	32	30	31	27	27	28	26	28
8	30	24	30	29	28	28	31	28	30	28	29	25	31	25	30	24	25	25	24	28
9	30	28	29	26	29	24	24	23	26	28	30	30	32	29	30	29	27	27	29	28
10	25	25	26	27	25	27	29	27	30	25	26	23	26	25	25	25	26	26	27	27
11	29	29	28	27	27	25	25	27	26	30	29	26	26	27	27	24	21	25	23	28
12	33	32	34	27	33	26	25	27	29	33	31	21	30	26	29	27	27	27	24	30
13	29	30	28	28	29	24	21	27	26	28	27	26	27	26	29	29	25	23	23	29
14	31	30	30	30	29	27	27	28	26	31	28	27	26	26	27	30	26	26	27	28
15	32	31	31	31	31	32	29	32	32	30	29	25	29	28	26	29	30	26	26	29
16	25	25	23	25	28	24	20	25	23	22	24	20	22	26	24	25	22	22	22	25
17	25	21	25	26	28	24	27	25	24	23	28	19	26	26	24	25	25	24	23	27
18											27	24	27	28	28	29	29	27	26	29

Table 10 Anticipation, Perception Score

Name	UAE	Poland	Russia	France	Canada
Score	-1.569	-4.028	-1.928	-1.254	-0.755
Name	Switzerland	Spain	Italy	Britain	China
Score	-0.991	-0.637	-2.355	-2.99	-0.808

The Evaluation Procedure:

(1) We chose forty students as assessors from 2008 grade bilingual class on business administration of South China University of Technology, who are the quizzes in the study of user experience's influencing factors based on Grounded Theory, and are familiar with the assessment object, so we think they are the idea assessors. We divide them into ten groups, every group has 4 students, in an arranged place.

(3) Second, we tell users the URL of online world expo, let them browse the website and score basing on users' perception, marking √ at fit palace. 1-7 represents form strongly disagree to strongly agree. At perception score sheet, we add the item of overall quality to measure users' feel combining every factor (Appentix A).

(4) We get ten sets of data after selecting all data, that to say we take bake all evaluation sheet. According to the data, we respectively calculate the

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sum of expectation and perception of every index, get the Table 9.

(5) According to formula

$$SQ = \sum_{i=1}^{s} u_i \sum_{j=1}^{m_i} w_{ij} (\overline{P_j} - \overline{E_j})$$, and every index's weight, we put the total expectation score and perception score of ten online pavilions into the formula to calculate the SQ value, the results are shown in Table 10.

UAE=-0.234-0.48-0.126-0.15+0.106-0.134-0.084-0.038+0+0.07+0-0.109-0.138-0.129-0.12-0.051+0.048= -1.569

Poland=-0.39-0.864-0.042-0.18-0.742-0.201-0.42+0.038+0.084-0.14-0.054-0.109-0.276-0.129-0.24-0.255-0.032= -4.028

Russia=-0.234-0.768-0.084-0.15+0.106-0.134+0+0.038+0.126+0-0.036-0.436-0.069-0.172-0.08-0.051+0.016= -1.928

France=-0.234-0.288+0-0.12-0.106+0-0.168-0.152-0.126-0.14+0+0-0.138-0.172-0.12+0.051+0= -1.254

Canada=-0.156-0.288+0-0.12+0.53+0.067+0.084+0.076+0.042+0+0-0.436+0-0.086-0.2-0.204-0.064= -0.755

Switzerland=-0.156-0.288+0.168-0.15-0.424-0.067-0.504-0.152+0.21-0.14-0.018+0.109+0.345+0.129-0.12+0.051+0.016= -0.991

Spain=-0.234-0.288-0.084-0.09+0+0.134-0.252-0.228+0.126-0.21-0.072+0.218+0.276-0.043+0.04+0.102-0.032= -0.637

Italy=-0.078-0.576-0.126-0.12-0.212+0-0.42-0.114+0.168-0.07-0.036+0-0.276-0.086-0.024-0.153-0.016= -2.355

Britain=-0.078-0.384-0.168-0.06-0.106-0.228+0.126-0.21-0.054-0.545+0-0.504-0.207-0.043+0.24-0.051-0.016= -2.99

China=0-0.288+0.126+0.12-0.318+0-0.084+0+0+0.14-0.036-0.327-0.069-0.129-0.04+0.153+0.064= -0.80

The general ranking is as following: Spain, Canada, China, Switzerland, France, UAE, Russia, Italy, Britain, and Poland.

The final assessment scores of the ten pavilions are not greater than 0, people given the high expectation to the 3D website's quality, and exceeded the perception. As the development of this website is not enough mature, many expectations cannot be satisfied, but there is a great development prospect in this filed. In a word, Spanish online pavilion is relatively successful, users' perception is not far from expectation, and almost meet users' satisfaction. However, Polish Online Pavilion is far from better, the difference between users' expectations and perception is relatively bigger.

In the evaluation, we ask the user to give the website an overall quality rating in the questionnaire, and it's the results: Switzerland, Spain and China, received 29 points, France and Canada, received 28 points, UAE, Russia and Italy, received 27 points, Poland and Britain, received 26 points and 24 points respectively. We can conclude that 3D website evaluation mode has better effectiveness and feasibility.

As the top one, the Spanish Pavilion's information and technical quality has reached a high satisfaction, user's actual experience is better than expectation. Though the depth and breadth, relevance, immersive, interactive of information can satisfy users' demanding, the purpose of information and the conception of technology are not rational. The moderate information can provide sufficient knowledge and clearly demonstrates to users, but chaotic providing way needs users waste a lot of effort to understand. The 3D website makes users feel as if they are actually here and can get feedback when interacts with it, but it is too difficult for user to combine the website with other thing to make a good association.

The quality of the emotion, aesthetic and function is far from users' expectation. The creativity, sociability, story, entertainment, artistic appeal, usability, navigation and education are unable to satisfy users' expectation, however, the sensory impact, interface design and usability has exceeded the expectations. The Spanish Pavilion does not give the user a pleasant surprise, the social happiness or the useful information, no funning games, lacking artistic in designing, some features are not available, and failing in travel guiding, made the website lacked of attraction. However, The operation is quite simple and the design of user-interface impresses users deeply.

In short, Spanish Online Pavilion gives users a wonderful experience journey, the 3D effect makes users immersed in the virtual world, the interaction makes the users felt like participating in Shanghai World Expo personally. The website allows users to choose their favorite route, the fine interface

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designing and background music attract users deeply. So the Spanish Pavilion is one of the most successful 3D Pavilions.

The Polish online pavilion ranks last in the output, there is a big gap between the perception and expectation. The quality of the emotion, aesthetic and function is far from user's satisfaction. The creativity, sociability, story, entertainment, sensory impact, interface design, artistic appeal, navigation, education, the depth and breadth, relevance, immersive and interactive of information are unable to satisfy users' expectation. However, usability has reached the user's expectations.

The Polish Online Pavilion doesn't give the user a fresh feeling, it can't satisfy user's social contact and entertainment requirements, the Information the website provided is redundant. Though the 3D virtual technology is vivid, it is difficult to make the users immersing in the website. However, the effectiveness of the website makes it easy to learn, and gives users a better experience.

Through the analysis, we can get that not only can the 3D websites quality assessment model give a general evaluation of the 3D website, but also grasp the overall quality of the construction, comparatively analyze the specific indicators, and identify and modify the local defects.

According to the analysis, the user experience management system is established and contributes to a better user experience, increases user dependence and improves the success rate of the construction.

Understand the customers' various and uncertainty requirements, which need the project builders to analyze and screen to mine users' purpose from the fuzzy understanding, communicate with users and developers to find the similarities and differences in asymmetric knowledge, And build the right mental model on the basis of user's own social cultural background. After analyzing this model, the influencing factors of the 3D website's user experience give us inspiration and preparation for better user experience.

Analyze the difference between the user experience and expectations. Satisfaction = Experience perceived value - expected value, in the investigation of the user's satisfaction of the quality, we should focus on the various indicators, especially the critical indicators and the considerable difference between expectations and perception at the critical experience points. In addition, the analysis of the difference between perception and expectations should be done to develop an effective improvement program. Not only should we make the user satisfied, but also bring extra surprises to them. .

Equip the continuous improving feedback system and user databases. Analysis the reasonable opinions about the user experience, constantly increase the satisfaction of the user experience and dependence, and improve the success rate of the construction. Build the user database, recording the user's habits, requirements and opinions, using a variety of analytical methods to sum up the experiences and lessons, which provide reference to the future construction. The good reputation and continued usage help the website to achieve more publicity.

In general, we should grasp the key experience points in improving the quality of 3D website, understand the user's requirement practically. The user experience management is a complex process which involving various factors and needing further study. The factors that affect the user experience are diverse, and the influence needs our further exploration.

6. CONCLUSIONS

With Shanghai World Expo online pavilion as research subject, the assessment is basing on 3D websites quality assessment model and the expectation-perception difference thinking. 40 college students are divided into 10 groups, and ranked 10 pavilions respectively, the results are as follows: Spain, Canada, China, Switzerland, France, UAE, Russia, Italy, Britain, and Poland, and also giving the highest and lowest online pavilion detailed analysis to verify the effectiveness and practicality of the assessment model, and explaining the usage of the model. This study brings some enlightenment in the user experience management :(1) Understand the customers' requirements. (2) Analyze the difference between the user experience and expectations. (3) Equip the continuous improving feedback system and user databases.

The 3D websites quality assessment model established in this study with combining qualitative and quantitative, made the weights more objective and the evaluation results more accurate. The model is easy to use, has strong operability and practicality. And not only can the assessment model rank the quality of different 3D website, but also comparatively analyze the indicator of the quality. The website's user experience is in the hearts of users, expressed in user behavior, knowledge and emotions, and generated by interacting with the website. Website builders can manage and grasp

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the user experience effectively with the model, so as to improve the overall user experience.

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APPENDIX A : ANTICIPATION SCORE SHEET

The user anticipation of 3D website quality	most unimportant—most important						
Emotional quality	1	2	3	4	5	6	7
A1 The website's form and content gives a fresh feeling(creativity)							
A2 There is social area in the website, users can communicate with others.(sociability)							
A3 The website expresses a attractive story, and I indulge in it.(story)							
A4 The website sets some entertainment program, such as games, while giving me a wonderful experience(entertainment)							
Aesthetic quality							
A5 The technology of audio and video on website make me pleasant(sensory impact)							
A6 The interface design has a logical composition and a good colour co-ordination, particularly the home page.(interface design)							
A7 I am attracted by the strong artistic appeal, when visiting the website.(artistic appeal)							
Function quality							
A8 The website is easy to use, I can achieve the purpose efficiently and effectively(usability)							
A9 The items on the website is easy to understand, simple to operate, and I learn to use it quickly(easy to use)							
A10 The website can guide me to find the desired information, or directly enter to my favorite pavilion(navigation)							
A11 I can learn a lot knowledge about the world what I never know from the website(education)							
Information quality							
A12The information on website is abundant and meaningful(depth and breadth)							
A13 The information on website is related to world expo and the detailed degree is moderate(relevance)							
A14 The information on website have a main topic, and clear and easy to understand(objectivity)							
Technology quality							
A15 The model on website is realistic, immersive, and brings me a wonderful experience(immersion)							
A16 The website has a good and smooth interaction , and I can learn a skill or complete a task, let me be harvested(interactivity)							
A17 I get a special experience and infinite association after visiting the virtual space, I want to tell others(imagination)							