Evaluating Localized MOOCs: The Role of Culture on Interface Design and User Experience

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ABSTRACT In recent years, MOOC has become one of the most popular trends in global education. However, the completion of courses is still a great challenge for MOOCs. Thus, the evaluation of MOOCs is of great importance to online education. The goal of this research is to evaluate the interfaces of localized MOOC on PC platforms, specifically, to explore the role of culture on the interface design and its user experience (UX). Three studies were conducted in our research. In study 1, through an interview, we selected two localized MOOCs (Chinese University MOOC and Coursera), typical user tasks, and main factors of UX. In study 2, a content analysis was conducted to compare the interface design of the MOOCs selected in study 1. The results showed significant cultural differences in the interface design between the two localized MOOCs. In study 3, the UX was evaluated on Chinese University MOOC (CUM) and Coursera. It is found that the task-based UX of CUM is better than Coursera on four typical tasks. And the overall UX (usability, aesthetics, and pleasure) is much higher on CUM. The findings reveal the cultural influence on the interface design of localized CUM and Course. Accordingly, the Chinese user experience is better on CUM than Course. This research indicates a better UX of localized MOOCs also depends on culture-preferred interface design. Meanwhile, from the perspective of UX, we also provide some theoretical and practical implications for the enhancement of interface designs of localized MOOCs. Hopefully, this research can contribute to the design of localized MOOCs in China.

INDEX TERMS MOOC, culture, localization, interface design, user experience.

I. INTRODUCTION

During the information age, education has been deeply influenced by information science and technology. In this atmosphere, the Massive Open Online Courses (MOOCs) were invented to assist in spreading or learning knowledge in a more efficient way. With the urgent demand for E-learning mode, MOOCs have gained global attention since 2008. Soon the development of MOOCs created an amazing learning boom all over the world. Nowadays, MOOCs have provided rich learning resources and been widely acknowledged among learners.

The appearance of MOOCs has yielded a novel research field and created significant research topics on online learning. Over the last decade, MOOCs have gradually become a research hotspot and have generated numerous publications in the academic fields. According to the systematic review studies [1], [2], MOOC research shows the following trends: First, MOOC research is steadily increasing in the United States and some European countries, and has rarely existed in developing countries or regions. Thus, the localization should be one of the future themes in MOOC research, especially for developing countries, such as China which education has had rapid development. Second, most of the research focused on MOOC learners and mainly explores learners’ completion /dropout, since the percentage of completion of MOOC learners always remains at about 10%, and this rate is quite low for the online learning platforms [3], [4]. Thus, it is crucial of solving the problem of learners’ dropout for MOOC.

Many MOOC research, like learners’ experience, engagement, motivation, and learners’ satisfaction with the use
of MOOCs, are pretty closely associated with learners’ completion/dropout of platforms [3]–[5]. Although previous studies indicated one of the factors influencing the low engagement was the MOOC interfaces, little MOOC research has concerned about the issue of interface design on user experience [3], [6]. User experience refers to the complete psychological experiences of users when interacting with the product [7]–[10]. Good interface design can facilitate the communication between the users and the platform, and lead to higher user experience, thus increasing learners’ satisfaction and completion of MOOCs; On another side, problems of interface design will cause the usage of inconvenience, and then badly influence the quality of user experience, thus reducing learners’ completion of MOOCs [11], [12]. Therefore, studies on the interface design and its impact on Chinese users becomes the subject of our research.

Globalization and localization are two aspects of the design of MOOCs [13]. Globalization refers to the process of modifying MOOC designs and services for worldwide users [14]–[16]. Meanwhile, MOOCs also seek its localization, which means the process of customizing MOOC designs and services for a specific market or culture [14]–[16]. One of the determining success factors for Open Education Initiatives is localization. Nowadays, there exist different approaches to the localization of interface design for MOOC. For instance, some international MOOCs, such as Coursera, implemented its interface localization mainly through linguistic translation. Some local MOOCs, such as Chinese University MOOC (CUM) and XuetangX, were developed by local organizations, which compete with the Chinese version of Coursera. The current situation has brought forward the following questions: does localized design really promote the communication effect on MOOC? Since globalization enables people to learn about other cultures by various means, online users may be familiar with the interfaces preferred by other cultures. Therefore, is it necessary to consider interface design in the studies of MOOCs’ localization? Specifically, is there any difference in Chinese user experience of MOOCs based on diverse approaches of localization? And how does the interface design of MOOCs meet the demands of Chinese learners?

The purpose of our research is to systematically explore the impact of culture on the interface designs and corresponding user experience of localized MOOCs in China. First of all, to investigate whether there is any cultural difference in the interface design of popular localized MOOCs in China; second, to compare the corresponding user experience of selected MOOC platforms reflecting cultural differences on interface design. It is expected that this research can provide some theoretical and practical implications to enhance the design of localized MOOCs from the perspective of user experience, and improve the existing users’ completion rate of MOOCs and attract more and more new users in China.

After this introduction, Section II presents the literature review related to this research. Section III, Section IV, and Section V illustrate the three studies in our research, includ-

II. LITERATURE REVIEW

A. CULTURE AND COMMUNICATION

Culture is often defined as a set of learned knowledge, beliefs, feelings, behaviors, and ways of thinking, which are shared by a particular societal group [17]–[19]. Accordingly, culture also affects the way in which communication occurs [20], [21]. Different cultural dimensions have been proposed to evaluate cultural difference in communication, such as monochronic or polychronic time perception, high-context/low-context, long-term/short-term orientations, uncertainty avoidance, and holistic/analytic thoughts [20], [22].

To be more specific, the explanations of cultural factors are as follow: (1) whether events take place in a linear order sequentially (monochronic) or in a spontaneous fashion (polychronic), (2) extent to which the content relies on the context or explicit communications (high-context vs. low-context), (3) extent to which the long-term or short-term goals are valued (long-term vs. short-term orientation): Short-term orientation is concerned with the past and the present, while long-term orientation is concerned with the future, (4) the extent to which uncertainty and ambiguity are tolerated or predictability is desired (uncertainty avoidance), (5) the extent to which an individual attends to regard the cognition as a whole (holistic thoughts) or differentiates the object from its field and make analytical reasoning (analytic thoughts). Based on the above expression of cultural dimensions, we can better understand how a person may fit within the contextual framework in communication [23].

Culture can as well influence the way in which people interact with computers since human-computer interaction is one kind of communication. The interface is as a medium, through which the user operates computers or interactive systems to perform tasks [18], [23]. In order to facilitate human-computer communication/interaction, it is necessary to design interfaces matching users’ local cultures and communication preferences.

B. LOCALIZATION OF WEBSITE DESIGN

One approach to the interface localization is that the original language is translated into the local language while the initial design mostly remains unchanged [14], [15], [24]. Although the translation is of excellent quality, it is a possible lead to misunderstanding due to the information loss in the process of translation [25], [26]. A previous study showed a website, originally designed in English, got a higher usability score among British than French; on the contrary, a website originally designs in French, gained better usability from Francophones. These results have shown the translation does reduce the perceived usability, and also influence consumers’
return visit [25]. Actually, language translation is just a primary aspect of localization since the visual design of interface reflects the contentions and preferences of its native culture [18], [25]. So, the realization of localization should also focus on the look and aesthetics of the interfaces [27]–[29].

Another approach to localization is that interfaces should be designed according to the users’ local cultural profile [14], [15], [24], [30]. In recent decades, studies have proved significant cultural differences on design features between Western and Eastern cultures. For example, Hsieh et al. [31] explored design differences of local government and city websites in Taiwan and Australia. The results revealed Taiwanese websites have three-column layout and contain more multimedia, whereas Australian websites prefer using two-column layout and include more static text and pictures. The potential reasons for the differences are that Taiwan tends to be a long-term orientation and high-context culture, while Australia is inclined to be a short-term orientation and low-context culture. In addition, Alexander et al. [32] examined design differences on homepages of government, media, and news websites in Australia and China. It turned out that Chinese websites use more multimedia and navigation with parallel structures than Australian websites, while Australian websites have more quick links and links opening in new windows. These differences relate to the possible following cultural factors: uncertainty avoidance, long-term or short-term orientation, high-context or low-context, and monochronic or polychronic time perception. Therefore, all the research above has demonstrated considerable amounts of interface designs vary with local cultures. Whereas, there is less research on communication effect through cultural-related interfaces from the perspective of user experience.

C. USER EXPERIENCE: STRUCTURE, MEASUREMENT AND CULTURAL INFLUENCES

The structure of user experience has gradually shifted from the usability to the comprehensive experience (e.g., usability, aesthetics, and emotion). The definition of usability is the extent to which a product is used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use (ISO9241-11, 1998) [33]. However, Wallace et al. [34] suggested usability does not fully reflect the overall user experience, because people show more positive experience when interacting with more attractive products. In HCI design, aesthetics refers to the visual appeal of an interactive product (e.g., a website). Lindgaard and Dudek [35] proved the attributes correlated to the perceived aesthetics, can enhance user experience. Besides, emotion is another factor influencing user experience [37], [46]. Callahan et al. [14] and Carroll and Thomas [38] verified that what users really want is the joyfulness when interacting with the products. Purchasing behaviors are affected by website characteristics through the emotional responses of customers [35], [39]. In summary, all of the factors mentioned are critical to user experience.

The evaluation of user experience (UX) can be based on tasks or overall impressions. The task-based UX can be rated by participants at the end of each task or scenario, and the aim of these ratings is to improve the specific part of interface designs [40]. According to previous studies, ASQ (The After-Scenario Questionnaire) is very popular in the task-based UX research [41]–[43]. Meanwhile, the overall UX is usually evaluated immediately after participants complete all the interactions with the platform, and these sorts of ratings can be used to compare different designs of the platforms with similar functions [40], [44], [45]. CSUQ (The Computer System Usability Questionnaire) is proved to have the high reliability and validity for the measurement of usability in UX studies [46]–[48]. Moshagen and Thielisch [49] developed the Visual Aesthetics of Website Inventory (VisAWI), which can evaluate the visual aesthetics of websites from four facets: simplicity, diversity, colorfulness, and craftsmanship. This inventory has been widely used in studies of the visual design. In addition, de Angeli et al. [50] measured the emotional experience with a 7-point Likert scale including 3 items (engaging, entertaining, and pleasant).

User experience is also affected by cultural differences. Souza et al. [44] investigated 144 subjects on their attitude towards usability attributes of cell phones within four cultural regions. Results confirmed satisfaction and efficiency are significantly different across four cultural regions, and the outcomes are correlated with uncertainty avoidance and long/short-term orientation. Wang et al. [51] found that East Asians were higher than North Americans in searching efficiency on websites with large amounts of information. The possible explanation is that East Asians are accustomed to information-rich environments due to their holistic thinking style, whereas North Americans, who have an analytic thinking style, are accustomed to simple information environments. The interfaces matching cultural preferences can increase the user experience, such as usability and aesthetics. Liu et al. [52] explored how Chinese users evaluated the user experience of cellphones. The results demonstrated that three critical factors for users’ experience of cellphone interfaces, namely Hedonic Quality, Pragmatic Quality, and Conformity instead of the four factors in Western culture. The results also proved product preferences are affected by different thinking styles (holistic V.S. analytic). Mariani et al. [53] examined the impact of culture on customer online satisfaction ratings of a service. The result showed uncertainty avoidance negatively influences the online satisfaction, but long-term orientation positively affects online satisfaction. Therefore, culture, the acceptable social norms, and behaviors, has a significant impact on the preferences, attitudes, and judgment of interface design [54].

D. CURRENT TRENDS IN MOOCS’ USER EXPERIENCE

User experience is a significant factor of continuous intention to use MOOCs, which can facilitate the users’ concentration on online courses [2]. For the field of user experience in MOOC, current research mainly concentrates on usability
and emotion studies. Wang and Wang [55] analyzed the structure and function of five MOOC platforms and proposed that the advisability of Coursera is probably the best from the perspective of learners. Johansson and Frolov [42] developed a MOOC usability checklist through interview and heuristic evaluation. This checklist includes some principles of general usability guidelines. In the two studies above, design elements were the classification criteria for the usability dimensions. Yousef et al. [56] designed a questionnaire for users to evaluate the L2P-bMOOC platform. In this study, some usability factors involved users’ psychological experience, such as suitability, controllability, and learnability.

Meanwhile, some research analyzed the usability of MOOC elements’ designs. For instance, Monedero-Moya et al. [57] assessed two multimedia annotation tools: CaTool and OVA. Participants rated in a questionnaire about the quality of interaction with the two tools. The results of the usability and satisfaction showed significant differences in favor of OVA. Videos are considered as the most informative component of a MOOC [58]. Nishchyk et al. [59] investigated elderly users’ experience with three types of MOOC videos. In this study, methods involved user testing, observation, and interviews. The results showed the lecture video in the real classroom is the most preferable video.

Also, there existed some research comparing the usability of different MOOC platforms. Tsironis et al. [60] explored the usability of three popular MOOC platforms: edX, Coursera, and Udacity. Participants performed several tasks and then evaluated MOOC platforms through a questionnaire. Results showed that Coursera’s perceived usability was significantly better than both edX and Udacity. Koraleva et al. [6] compared the usability of MOOC interfaces between Coursera and Open Education. Participants rated the platforms by questionnaire and adjective description. The results indicated users are more satisfied with Coursera than Open Education, although both of them need to improve the interface design. Although some research has been carried out on the usability of MOOC, there have been few empirical investigations into the user experience of localized MOOC.

In terms of the prior research on the evaluation of MOOCs, some limitations still exist in this field. First, few studies are devoted to the analyses of visual design on localized MOOCs. In the background of globalization, localization is considered as a strategy to develop the worldwide market [31], [61]. Therefore, to what extent are these strategies different in the interface design among localized MOOCs? Second, a little attention has been given to aesthetics. However, aesthetics is as important as usability and emotion in user experience. Thus, it is necessary to assess the aesthetics and emotions in MOOCs. Third, few empirical studies can be found in the literature on MOOCs’ user experience. The experimental method can compare user experience under different designs and provide more scientific and reasonable evidence for design decisions on MOOCs. Consequently, researchers should combine experiments with quantitative and qualitative methods to further investigate the experience of MOOCs. Finally, very few studies have examined the effectiveness of localized MOOC. Previous studies have proved users in distinct cultures may have different needs and preferences for interface designs. However, enables people to frequently use websites, platforms or apps with diverse culture-preferred designs. So, in modern society, does localized design really promote the effect of communication between users and MOOCs? Specifically, is there any difference in Chinese user experience of popular MOOC platforms with different interface designs of localization? And how does the interface design of MOOC meet the demands of Chinese learners? All these are significant issues worth exploring.

In this paper, we conducted three studies to evaluate localized MOOCs. Study 1 was an interview, which identified the typical localized MOOCs, typical tasks, dimensions, and indexes of user experience. Study 2 was a content analysis, which explored whether the homepage interfaces of two localized MOOCs reflect cultural differences. Study 3 was an experiment combined with a questionnaire investigation, which compared Chinese user experience of two localized MOOCs.
Figure 1 shows the connections among the three studies. Our research intends to explore the communication effect among two kinds of localized MOOCs, which form a connection between culture, interface design, and user experience. Meanwhile, our research also provides more scientific and comprehensive analyses of localized MOOC’s interface design and user experience. The results can examine how different strategies of localization work well for the communication between users and MOOCs. Hopefully, our research can help designers select cultural-preferred interface designs of MOOC according to the user experience. Furthermore, we hope our research can improve the completion rate of MOOCs and facilitate MOOCs to spread knowledge and thoughts more effectively.

III. STUDY 1
Study 1 was conducted through interviews. Our goal is to select the localized MOOCs, typical tasks, and indicators of user experience.

A. PARTICIPANTS
A total of 16 MOOC experienced users including teachers, students, and other social workers (Age Range: 18 to 34 years; Gender: 9 Males and 7 Females) were recruited.

B. MEASURES
The structured interview was used in our study. The interview outline includes three parts: ① Basic conditions of usage on MOOC, such as platform’s name and use frequency; ② MOOC’s common functions; ③ Factors affecting MOOC’s user experience.

C. PROCEDURES
The experiment was conducted in the behavioral research laboratory. After a brief introduction and instruction by the researcher, participants signed their names on the information consent form and filled in the background questionnaire. Interviews with each participant took around thirty to forty minutes. Every Participant got some compensation after the interview.

D. RESULTS
1) THE MOST USED MOOC PLATFORMS AND FREQUENCY OF USAGE
Among all participants, 50% of them have used Chinese Universities MOOC(CUM), 31% of them have used Coursera, and 25% of them have used XuetangX. Since CUM and Coursera are used more frequently and they represented two kinds of localization styles, we choose them as research objects in study 2 and study 3.

2) TYPICAL TASKS IN MOOC PLATFORMS
During the interview, common functions mentioned by participants include signing up and logging in (100%), signing out (100%), selecting courses (100%), checking courses (81.3%), taking courses (100%), checking discussion forums (100%), checking homework (37.5%), posting comments (37.5%) and liking comments (25%). Incorporating interview results and specific contexts of usage, our study designed 8 typical tasks: 1. Sign up and log in, 2. Check Fudan University’s courses, 3. Select courses using search function, 4. Take courses, 5. Post and like comments in discussion forums, 6. Check courses, 7. Unsubscribe courses, 8. Log out. All these tasks were used in study 3.

3) FACTORS AFFECTING USER EXPERIENCES
During the interview, 68.75% of participants indicated that they considered whether the platform is user-friendly, whether the operation is easy, and whether the page layout is convenient for searching information as important usability factors. 18.75% of participants valued more on aesthetic factors such as whether the platform design is beautiful. In addition, 12.5% of participants mentioned that they put more attention on emotional experiences such as sense of joys. Therefore, we choose usability, aesthetics and pleasures as indicators of user experience.

IV. STUDY 2
In study 1, we selected two localized MOOC platforms. The aim of study 2 is to investigate whether Course and CMU have different interface designs. Since content analysis is a suitable and widely used technique for analyzing communication content [43], [62], [63]. In study 2, we used content analysis to systematically compare the interface design of the homepages between CUM and Coursera.

A. PARTICIPANTS
Two Chinese graduate students in computer science were employed as the coders in this study. They knew nothing about the purpose of this study. Before starting the content analysis, the coders were provided a document which explains the elements and terminology of visual designs in this study. Until totally understanding the explanations in the document, two coders can do the content analysis for the homepages of two MOOC platforms.

B. MATERIALS
According to a checklist, an audit was conducted on CUM and Coursera. The coders evaluated the existence and amount of design elements on the checklist. This list is generated based on the previous research, which has demonstrated that some design dimensions and included elements contribute to the quality of communication between users and interfaces [32], [64]. The dimensions comprise layout, navigation, links, multimedia, color, and text [32]. A layout is the visual structure and locations of information on a web page, which has five elements: numbers of the columns, main menu, banners, characters, and items on a webpage (headings, links, and images [32], [51]. A navigation should help users effectively acquire information, and it includes numbers of the menu (static and dynamic menu), fat footers, visible links, and level
of choices in the main menu. A link is usually an interactive element leading users to other or further resources. Links contain icons, external links, internal links, and links opening in a new browser window and total links. Multimedia refers to images, cartoons, videos, and multimedia control capability with the ‘Pause’ or ‘Play’ button. For color, the usage of color was counted by automation collection. The hue refers to the color of the image itself, saturation refers to the intensity of the color in an image, and lightness means the relative degree of black or white of the color [65]. The coders recorded the ratio of hues, saturation, and lightness of homepages. Text refers to the presentations for words in the two platforms, such as numbers of the headings, font types, font colors, and font background colors.

C. ANALYSIS PROCESS

Based on the checklist, the coders separately reviewed homepages of the MOOC platforms selected in Study1, and then independently made decisions on the units of analysis. The dimensions and included elements are described above. The number of “0” was for an element which did not appear in the homepage, and the numbers or the percentages of the element was recorded. After finishing the content analysis, we used SPSS to analyze the data. In order to evaluate saturation, lightness, and hues accurately, two screenshots from two platforms have been captured on a 24” high definition monitor. Then the saturation, lightness, and hues of each screenshot can be calculated based on each pixel’s RGB values.

D. RESULTS

1) INTER-CODER RELIABILITY

Cronbach’s Kappa is a widely used measure of rater agreement for nominal data. So, we chose Cronbach’s kappa to calculate inter-coder reliability for 34 design elements [57], [61]. According to the outcomes from SPSS, Cronbach’s kappa for CUM was 87%, and Cronbach’s kappa for Coursera sites was 90%. These Kappas ranged above 0.80, which indicates almost perfect agreement and are considered adequate for further analysis [66].

2) DESIGN DIMENSIONS: LAYOUT, NAVIGATION, LINK, MULTIMEDIA, TEXT AND COLOR

With regard to the dimension data, chi-square analysis was conducted to do cross-tabulation comparisons. As to each element in the dimensions, a z-test was conducted with the Bonferroni method for multiple comparisons between CUM and Coursera.

Regarding the layout, the chi-square test indicated there were significant differences between CUM and Coursera ($\chi^2 = 9.73$, $p = 0.032$). As to the items on the homepage (including headings, links, and images), the numbers in CUM (439) were greater than Coursera (84). The homepage of CUM contains more characters than Coursera (4041 vs 596). There were no significant differences between the two platforms on the following elements: banner (7 vs 3), column (5 vs 1), and main menu (1 vs 1).

With regard to the navigation, the chi-square test indicated there were significant differences between CUM and Coursera ($\chi^2 = 8.07$, $p = 0.04$). The multiple comparisons showed that Coursera had more links in the main menu than CUM (103 vs 11). There were no significant differences between the two platforms on the following elements: menu (1 vs 1), fat footer (1 vs 1), and levels of choices in the main menu (1 vs 2).

With respect to the link, the chi-square test indicated there were significant differences between CUM and Coursera ($\chi^2 = 11.41$, $p = 0.004$). The multiple comparisons showed that CUM used more images than Coursera (141 vs 15). Additionally, Coursera had one video, one pop-up, and one Multimedia control capability, all of which did not appear on CUM.

About the text, the chi-square test indicated there were significant differences between CUM and Coursera ($\chi^2 = 13.99$, $p = 0.003$). The multiple comparisons showed that headings were more highly used in Coursera (10) than CUM (0), while there existed no significant differences between the two platforms on the following elements: font type (7 vs 3), font color (4 vs 6), font background color (8 vs 4).

As far as the color is concerned, the chi-square test indicated there were significant differences between the two MOOCs in hue ($\chi^2 = 10.67$, $p = 0.04$), and in saturation ($\chi^2 = 7.33$, $p = 0.03$), and there was no significant difference in lightness ($\chi^2 = 2.69$, $p = 2.51$). About the hue, the multiple comparisons showed that green was more highly used in CUM (22.24%) than Coursera (9.3%), while there existed no significant differences on the following elements: red (65.03% vs 74.26%), orange (4.73% vs 2.4%), yellow (2.57% vs 1.2%), blue (2.53% vs 6.89%) and purple (2.9% vs 5.93%). As to the dimension of saturation, the multiple comparisons showed that low saturation of colors were more highly used in Coursera (83.13%) than CUM (66.54%), while middle saturation of colors were more highly used in CUM (20.88%) than Coursera (9.55%). There were no significant differences between CUM (12.59%) and Coursera (7.32%) on the range of high saturation. On the lightness, there were no significant differences on the following ranges: low lightness (18.28% vs 10.68%), middle lightness (14.52% vs 11.99%), and low lightness (67.2% vs 77.3%).

V. STUDY 3

The results of study 2 showed significant cultural differences in the interface design between Coursera and CUM. In study 3, we try to explore whether Coursera and CUM
have different UX. Participants completed all the typical tasks separately in these two platforms. The task-based UX were rated by participants at the end of each task, and the overall UX were measured immediately after participants complete all the tasks.

A. PARTICIPANTS
A total of 42 college students (Age Range: 19 to 29 years; Gender: 22 Males, 20 Females) were recruited. Each participant had normal or corrected vision, and no eye diseases. They were all right-hander. All participants had at least one-year experience using computers and Internet.

B. EXPERIMENTAL DESIGNS
The experiment is a within-subject design. The independent variable is the types of MOOC platforms (CUM and Coursera). The dependent variable includes the user experience and its sub-dimensions. Specifically, we evaluated the task-based UX and the overall UX (usability, aesthetics, and pleasures).

C. MATERIALS AND MEASUREMENTS
The experimental materials are websites of CUM and Coursera. The width of webpages is 1920 pixels, and the length depends on different page size.

ASQ [46]: The questionnaire tested the task-based UX. A total of 3 items were incorporated into the three dimensions of this scale including effectiveness, efficiency, and satisfaction. All items were rated on a 7-point scale. Participants were asked to complete this questionnaire after each task. The ASQ demonstrated good reliability (Cronbach’s $\alpha = 0.90$).

CSUQ [47]: This questionnaire was used to measure the usability of overall UX. A total of 19 items were incorporated into the four dimensions of this scale including the overall satisfaction score (OVERALL), system usefulness (SYSUSE), information quality (INFOQUAL), and interface quality (INTERQUAL). The CSUQ demonstrated excellent reliability (Cronbach’s $\alpha = 0.95$).

VisAWI [49]: The questionnaire was for the aesthetics of overall UX. A total of 18 items were incorporated into the four dimensions of this scale including simplicity, diversity, colorfulness, and craftsmanship. The VisAWI demonstrated excellent reliability (Cronbach’s $\alpha = 0.94$).

Pleasure: 7-point scale with only one dimension including three items: joyness, entertaining and engaging. This questionnaire was used to rate the emotional experience of overall UX [50].

D. PROCEDURES
The experiment was conducted in a behavioral research laboratory. After filling in the background questionnaire, participants were given brief introductions by researchers. Then they were directed to read experiment instructions and scenarios. For each trial, participants were given a specific task. After understanding the instruction for the task, participants pressed F10 and were directed to the MOOC website. Participants should follow website instructions and perform tasks based on the completion signs. The whole process did not have any time limits. Once accomplished, they pressed F10 to fill in the ASQ questionnaire. Then, they pressed F10 again to the next trial. After all trials completed, participants filled in CSUQ, VisAWI, and Pleasure for each platform. The display sequence was balanced during the experiment. The experiment for each platform lasted for about 20 minutes. After the experiment, participants were invited to give some feedback on their usage. Participants some compensation after the experiment.

E. RESULTS
1) RESULTS OF TASK-BASED UX
SPSS 20.0 was applied to analyze the effectiveness, efficiency and satisfaction for each task from CUM and Coursera. Ratings of these dimensions are shown in Figure 2-4 below.

The kinds of MOOC platform were considered as the independent variable, and effectiveness, efficiency and satisfaction were defined as dependent variables. The results of T test are as follows. For task 1, there are significantly difference on all dimensions: effectiveness ($t = 1.86, p = 0.07$), efficiency ($t = 0.42, p = 0.68$), and satisfaction ($t = 1.96, p = 0.06$). For task 2, all dimensions are significantly different: effectiveness ($t = 2.80, p = 0.01$), efficiency ($t = 3.84, p = 0.001$), and satisfaction ($t = 1.85, p = 0.08$). For task 3,
all dimensions are not significantly different: effectiveness ($t = 0.67, p = 0.51$), efficiency ($t = 0.96, p = 0.34$), and satisfaction ($t = 0.744, p = 0.46$). For task 4, all dimensions show significant differences: effectiveness ($t = 3.19, p = 0.003$), efficiency ($t = 2.94, p = 0.006$), and satisfaction ($t = 2.31, p = 0.03$). For task 5, all dimensions are not significantly different: effectiveness ($t = 0.00, p = 1.00$), efficiency ($t = 1.82, p = 0.08$), and satisfaction ($t = 0.00, p = 1.00$). For task 6, all dimensions show significant differences: effectiveness ($t = 2.99, p = 0.01$), efficiency ($t = 4.10, p = 0.00$), and satisfaction ($t = 3.56, p = 0.001$). For task 7, all dimensions are not significantly different: effectiveness ($t = 0.76, p = 0.46$), efficiency ($t = -0.45, p = 0.66$), and satisfaction ($t = 0.70, p = 0.95$). For task 8, all dimensions are significantly different: effectiveness ($t = 3.07, p = 0.01$), efficiency ($t = 2.26, p = 0.03$), and satisfaction ($t = 2.41, p = 0.02$). To sum up, Chinese Universities MOOC was rated higher than Coursera on task 2, 4, 6, 8.

2) RESULTS OF USABILITY IN OVERALL UX
CUM shows better usability than Coursera among Chinese participants: system usefulness ($t = 3.60, p = 0.01$), information quality ($t = 4.28, p < 0.01$), interface quality ($t = 3.20, p = 0.03$), satisfaction ($t = 2.94, p = 0.06$), and usability ($t = 4.04, p < 0.01$).

3) RESULTS OF AESTHETICS AND PLEASURE IN OVERALL UX
For simplicity ($t = 2.39, p = 0.02$), diversity ($t = 2.33, p = 0.02$), colorfulness ($t = 2.05, p = 0.04$) and overall aesthetics ($t = 2.46, p = 0.02$), Chinese participants indicate better user experiences from CMU instead of Coursera. For craftsmanship ($t = 1.86, p = 0.07$), ratings for CMU and Coursera are not significantly different. For pleasure ($t = 3.22, p < 0.00$), Chinese participants indicate more pleasure from CMU instead of Coursera.

VI. DISCUSSION
The aim of this section is to explain the findings of UX according to the interface design of two localized MOOCs selected in our study. Then we provide some principles of interface design for the Chinese localized MOOCs.

A. INTERFACE DESIGN AND TASK-BASED UX
Task 2 is “Check the relevant courses offered by Fudan University”. Participants’ post-experiment feedback indicated the procedures in Figure 8. Regarding to task 2, the task-based UX of CUM is much better than Coursera. We suggest the following reasons: First, the “Universities” link is pretty key to MOOC, so it should be placed on a prominent location. But on Coursera, this link is at the median or the bottom of the homepage. Second, “Cooperative Partners” are rarely considered as “Universities” directly in China. According
to Chinese dictionaries, cooperative partners usually mean persons or institutes that share resources in business. Therefore, this phrase does not adapt to Chinese users’ cultural backgrounds. According to the given reasons above, Chinese users felt more difficult to complete the task on Coursera. For the sake of optimal localization, a translation should not only keep the original meaning but also match user’s cultural characteristics [18], [25].

Task 4 is “Attend Courses”. Users were asked to learn the third section of a course in Week 1. Figure 9 shows the procedures of task 4. As for task-based UX, CUM received a higher rating than Coursera. According to participants’ post-experiment feedback, there are two possible explanations for this result. First, the procedure design on Course does not meet Chinese users’ expectation. Participants expected an initial information classification containing course elements (such as videos, assignments and so on); and after clicking on Videos, they anticipated a list of clearly ordered videos and selected the third video from the list. However, most participants could not find a category named Videos on Coursera, so they at first hesitated and then clicked “First Week” in the left menu, and then found the third video on the next page. The originally anticipated classification reflects Chinese users’ representation of parallel structure for events. Whereas, Coursera provides a sequential structure of courses classification. This contradiction indicated the difference in time perception between West and East Asia. For instance, monochronic cultures (such as the U.S.) are inclined to perform one task at a time, and emphasize the sequential process; While, polychronic cultures (such as China) tend to deal with multiple tasks simultaneously [20], [21]. Probably Chinese participants were more accustomed to the parallel structure for an event and felt more comfortable to perform tasks based on such a classification.

Task 6 is “Check the relevant information of the assignments”. Users were asked to search for the assignments of a course. Figure 10 shows the procedures of task 6. Obviously, it took more steps to complete the task on Coursera than CUM. CUM provided better task-based UX than Coursera. The potential reasons are as follow: Course information in CUM is categorized by course elements, such as courseware, assignments, exams, and so on. This is a parallel classification approach. However, course information in Coursera is organized according to the timeline, such as week1, week2, and so on. Assignment information is in the property frame of each week. This indicates the classification is based on the linear scheduling of a course. These designs above reflect different time perception between West and East Asia. For example, monochronic cultures (such as the U.S.) are inclined to perform one task at a time, and emphasize the sequential process; While, polychronic cultures (such as China) tend to deal with multiple tasks simultaneously [20], [21]. Probably Chinese participants were more accustomed to the parallel structure for an event and felt more comfortable to perform tasks based on such a classification.

Task 8 is “Sign out”. Users can click “Exit” from the “Personal Center” at the upper right corner. Figure 11 shows the procedures of task 8. The evaluation for CUM was significantly better than Coursera. A possible reason might be that CUM’s design helped users log out more quickly. On CUM, only two choices (setting and exit) are in the personal center, so users can find “exit” soon. However, there are six functions in the personal center of Coursera, and the last one is “exit”. Thus, users spent more time...
on seeking “exit”. Actually, these two designs indicate the difference in cultural-related thought styles. With holistic thought, East Asians are more likely to group objects by relationships [22]. So “personal profile”, “help center” and other choices are regarded as parts of “setting” based on the part-whole relationship. Conversely, Westerners with analytic thought tend to tell the object from its context and group [22]. Consequently, the six choices on Coursera are separately presented since they are perceived as distinct functions due to different rules or categories.

B. INTERFACE DESIGN AND OVERALL UX

In study 2, we found characteristics of interface design, such as layout, navigation, link, multimedia, text, and color, varied significantly between CUM and Coursera. These differences reflect the cultural influence on interface design, and might be the possible reasons to explain Chinese users’ preferences on CUM [8], [25], [67]. Study 3 also examined the overall user experience including usability, aesthetics, and emotional experience. The results showed that CUM has better overall UX than Coursera. First, CUM has better user experience than Coursera on usability containing information quality, system usefulness, and interface quality. Second, CUM has higher scores than Coursera on the ratings of aesthetics including simplicity, diversity, and colorfulness. As to emotion, Chinese users felt more positive experiences when using CUM than using Coursera. Compared with Coursera, they think CUM is more entertaining and engaging, and they feel more joyful when interacting with CUM. Combined the findings of Study 2, we provide some likely explanations and design principles.

CUM’s visual density is much higher than Coursera; besides, CUM has more external links and more links open in a new window than Coursera. These design features are widely used in low-uncertainty avoidance, polychronic, and holistic cultures, since users grown up in such cultures are accustomed to high loads of information, can switch flexibly among parallel links, and prefer more external links connecting to more social relationships; in contrast, high-uncertainty avoidance, monochronic and analytic cultures are fond of limited links and information flow to prevent interruption of individuals’ work [14], [20–22], [68], [69]. Although CUM has many visual items and characters, they are organized in a five-column structure. The layout of CUM were evaluated to be pretty clear, so the information is easy to be found. In addition, CUM also adopts the original language and local terms, so Chinese users can easily understand the information. Users also thought it was easy to complete their work more effectively and efficiently on CUM. Additionally, the interface of CUM was perceived to be pleasant and preferred. Thus, Chinese users felt more comfortable and satisfied when using CUM.

CUM used less headings but more icons, images, and slides than Coursera. Meanwhile, CUM uses more low and middle saturation of colors than Coursera. From the perspective of
diversity, CUM was perceived to show more visual richness, and appear more varied and creative in Chinese group. In regard to colorfulness, more intense of colors and their compositions on CUM are more appealing to Chinese users. In spite of the high visual density, homogeneous information is grouped together in CUM. Simultaneously, all the groups are evenly distributed in the layout with five-column structures. Accordingly, the interface design of CUM was considered to promote the processing of its layout since its layout looks more ordered, balanced, and well-structured than Coursera. These results are likely to be related to culture-preferred web designs [8], [32], [68], [70], [71]. High-context and long-term orientation cultures are inclined to add non-text cues to understand information, and can tolerate longer processing time; conversely, low-context and short-term orientation cultures require direct and explicit formal information, so the less usage of icons, images, slides, and intense colors is to minimize distractions, but headings are used more to reduce the search time [15], [20], [21], [68]. In addition, Intense colors are so pure and striking that they are frequently used to emphasize information and catch attention in high context and low-uncertainty avoidance cultures.

However, some findings of our research are contrary to the previous studies. Firstly, it is interesting to note that green was used more in CUM than Coursera. This result is not consistent with prior research that indicated blue and red were highly used in Chinese websites [67], [72]. The possible reasons may be the associations of green. In China, green is associated with development, ideal, and hope [73], which can be considered as the goals of education. However, the generalization of this finding still needs to be tested in more MOOCs’ platforms. Secondly, Hsieh (2014) showed that Taiwanese users were satisfied with the Chinese websites embedded with both Taiwanese style and Australian style [41]. This differs from the finding presented here. In our studies, Chinese users had better task-based UX and overall UX in CUM than Coursera. This inconsistency may be due to the following factors: somewhat discrepancy of sample in Chinese culture, evaluation perspectives (satisfaction vs user experience), design of experiments and tasks, website types (government website vs MOOC platform) and so on. But anyway, our studies have proved that localized design is still necessary for the communication effect on MOOCs, even when the young generation is easily affected by various cultures in the age of globalization. At least the interface design of localized MOOC should meet the demands of Chinese learners.

C. APPLICATION AND CONTRIBUTION
On the analyses of the above, we provided the following principles of interface design for the Chinese version of Coursera or localized MOOCs in China.

1. It is recommended the “Universities” link should be quite obvious and added on the top of the homepages. Also, it is better to change “Partners” to other understandable words in Chinese, such as “Universities” or “Cooperative Universities”. The original language and local terms should be adopted in localized MOOCs as much as possible, so that Chinese users can easily understand the information.

2. The classification of course information should be appropriately adjusted on the basis of Chinese users’ expectations or customs. For instance, the menu of course should be categorized by course elements, such as videos, courseware, assignments, and so on. This principle of classification reflects the features of polychronic cultures in East Asia. In addition, labels should be added to number videos of the course. The goal of these modifications is to reduce the costs of users’ thinking during the operation [74], and also simplify the operation steps of this task for Chinese learners.

3. Relationships and categories are regarded as the different bases for grouping in the personal centers of CUM and Coursera. In order to achieve a better UX for logging out, choices in Coursera’s personal center should be well organized according to the principles of objects’ connections and part-whole relationship, which is preferred by East Asians with holistic thought.

4. It is better to present moderately high visual density for Chinese users, also, it is better to contain more icons, images, and slides in localized MOOCs of China, since these features are fancied by uncertainty avoidance, high-context and long-term orientation cultures, such as China. At the same time, these items should be appropriately organized together. Thus the interfaces are evaluated to be diverse, ordered, balanced, and well-structured.

5. Links opened in a new window can be applied in the Chinese localized MOOCs, since users grow up in polychronic cultures are accustomed to efficiently process works in a parallel pattern; meanwhile, developers can consider adding more external links related to education, for Chinese learners with holistic culture may like obtaining more educational and social resources while using MOOCs.

6. In order to highlight information and attract Chinese attention, localized MOOCs also can use more low and middle saturation of colors and compositions. This design requirement indicates the appeal of color in high context and low-uncertainty avoidance cultures. Moreover, it is meaningful to know whether particular hues of color are more favored in localized MOOCs.

Our research could make significant contributions in the following important ways. First, it does propose a set of theories and methods for evaluating localized MOOC platforms, which includes the MOOC’s typical tasks, design elements, factors and indexes of user experience and their measurements. The developers and designers can examine the communication effect of MOOCs according to the users’ feedback and experience, and make design decisions. Second,
our research shows the role of culture plays in the localization of MOOC. The culture factors include time perception, context, term orientations, uncertainty avoidance, thought styles and so on. Culture affects many design features, such as layout, navigation, links, multimedia, color, and text. Culture-related designs do influence the perceived usability, aesthetics, and pleasure. Although Coursera developed its localization mainly through language translation, it did not get better user experience than CUM in China. Therefore, it is still necessary to design culturally appropriated interfaces in localization. Third, this research can provide some practical applications for the development of localized MOOCs. Based on these findings, interface design can be appropriately modified to meet the needs and preferences of specific user groups during the localization process. Finally, our study applies a novel method for the content analysis of color. To be specific, we classified the colors with their HSL values instead of RGB values. With RGB, it is only possible to classify color to different categories (e.g., green, lime, yellow, etc.), but HSL can respectively get the data of hue, saturation and lightness base on corresponding values from each of pixels.

VII. CONCLUSION

Nowadays, MOOC has gained great popularity for education and learning in the information age. The success of MOOC may depend not only on its globalization but also on its localization. Thus, it is of great significance to examine the communication effect of localized MOOC among users from different parts of the world. However, there are rare studies systematically evaluate how localization of interface design work well for the communication effect between users and MOOCs. The current research provides an exploration for this promising field. In other words, this research attempted to investigate the interface design and the corresponding user experience of two localized MOOC platforms in China.

Specifically, three studies were conducted. In study 1, the researcher interviewed sixteen users. Based on the interview we selected two localized MOOC (Chinese University MOOC and Coursera), eight typical tasks, and three main factors of user experience (usability, aesthetics, and emotion). In study 2, a content analysis was conducted to contrast Coursera with Chinese University MOOC (CUM) on web design. The outcomes indicated that there were significant differences in the following design dimensions: Layout, Navigation, Link, Multimedia, Text, and Color. These differences reflect the culture influence on web design. In study 3, a behavioral experiment combing questionnaire inquiry was conducted. Thirty users completed the eight typical tasks on CUM and Coursera, and the user experience of the web design was evaluated. The results showed that the task-based user experience on CUM was much better than Coursera when Chinese users checked the course, attended the class, viewed the assignments and logged out. And the overall user experience (usability, aesthetics, and pleasure) is much higher on CUM than those on Coursera. Thus, our results suggest that more Chinese users would favor CUM over Coursera.

In the discussion section, we provide some likely explanations and principles of interface design for the localized MOOCs in China.

Some related directions worth further exploring is listed as follows: First, all the participants in this research were college students. The future study should expand the population to other samples of Chinese with different ages, diverse professions, varied experience, and so on. Second, the current research focused only on the user experience of the overall design. Further research can be conducted to examine the effect of design attributes on user experience. For instance, as to different designs of multimedia, future explorations on the evaluation of these multimedia will provide useful evidence for the design decisions of localized MOOCs. Third, Future research should examine the proposed framework on other kinds of localized MOOCs under simple procedure of expert evaluation. Forth, this research focus has been mainly on UX of the interfaces and looks. However, the lack of interactivity is another factor affecting the engagement of learners in MOOCs. Future UX study should investigate how various interactivities can promote learners’ completion of MOOCs. In addition, only questionnaires were used to collect data in the study of user experience. However, other objective indexes and techniques can be greatly helping to understand the process of interaction. In future research, it is expected to combine the multiple methods together, including interviews, experiments, questionnaire, and eye-tracking to obtain objective and subjective indexes of user experience. Finally, with the development of MOOC, our evaluation work should be constantly developing and gradually updating. Further work will be needed to explore more tasks, new design attributes, advanced techniques, novel factors, and evaluation models of user experience of MOOCs.

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