

# Exploring Chinese University Students' Preference about U-learning Environment

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**Abstract:** *In this paper, we explored the University students' perception about U-Learning environment. Data were collected from 136 higher students (71 males and 65 females) in Beijing via self-reported questionnaire: Questionnaire of Perceptions about U-Learning environment (PUEQ), including eight scales (T-EU, T-CO, C-RE, C-AC, C-MS, CT-TG, CT-SN, CT-IL). Result revealed this PUEQ can be used for the Chinese context with good validity and reliability. Further analysis results indicated that different gender and grade students had different preference about u-learning environment. These results will give some advice for the future u-learning environment design.*

**Keywords:** Chinese university students, U-learning environment, preference

## 1. Introduction

In recent years, the instruction based on the Internet become very often and wide in Chinese University. In the Internet-based learning environments students could have many new learning opportunities. Previous studies (Sadler-Smith & Smith 2004; Woo 2009) indicated that students' individual learning preference should be supported by more flexible learning environment. For example, Woo (2009) have concluded that designers should support interactions with several agents and yet provide a mode of communication that is effective for the instruction. With the advance of information technology, the innovative u-learning environment emerged in the university course. U-learning (ubiquitous learning) has become the leading educational trend in information age (Jeong & hong, 2013). College teachers would like to make use of some learning management system to assign some learning task. In order to explore the Chinese college students' preference, this study aimed to revised the CULES questionnaire, developed by Tsai, Tsai and Hwang (2012) to make a deep understanding about Chinese students.

In sum, this study included the following research questions:

- (1) Can this questionnaire be used for Chinese mainland college students to measure their preference about u-learning environment?
- (2) What are the university students' preferences about u-learning environments in China?
- (3) Is there any difference between male and female students' preference about u-learning environment?
- (4) Is there any difference among different grade students' preference about u-learning environment?

## 2. Methods

### 2.1. Participants

The participants in this study included 136 college students in Beijing, China. The study took part in the convenience sampling. There were 71 male and 65 female students. They were from different grades (G1: G2: G3: G4=26:54:29:25, with two students missing) in a famous university in Beijing, China. All of the participants had actual experience of using mobile devices for learning. All participants responded to the questionnaire paper-and-pencil format

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in this study, and their backgrounds were also collected, such as age, gender, and grade level.

## **2.2. Instruments**

### ***Perceptions about U-learning Environment***

The Perceptions about U-learning Environment questionnaire (PUEQ) was modified from the CULES to investigate the students' Preference about U-learning Environment, which was developed by Tsai, Tsai & Hwang (2012) and attempted to measure the college students' perceptions about U-learning environment, validly.

This instrument included 8 factors:

- The T-EU scale measures perceptions of the extent to which students prefer that u-learning environments are easy to use. The example item is 'when navigating u-learning environments, I prefer that they have user friendly mobile devices'.
- The T-CO scale measures perceptions of the extent to which students prefer that u-learning environments help them continuously keep track of their own learning. The example item is 'when navigating u-learning environments, I prefer that they can help me keep track of my learning'.
- The C-RE scale measures perceptions of the extent to which students prefer that u-learning environments are authentic and represent real-life situations. The example item is 'when navigating u-learning environments, I prefer that they show how complex real-life environments are'.
- The C-AC scale measures perceptions of the extent to which students prefer to have opportunities to browse documents and information based on their requirements in u-learning environments. The example item is 'when navigating u-learning environments, I prefer that they can provide information that I need, e.g. documents, images, and voice'.
- The C-MS scale measures perceptions of the extent to which students prefer that u-learning environments contain various relevant and multiple information sources. The example item is 'when navigating u-learning environments, I prefer that they can discuss a learning topic through various perspectives'.
- The CO-TG scale measures perceptions of the extent to which students prefer to have opportunities to receive TG for supporting them with the adaptive directions in the learning process at the right time and in the right place provided by u-learning environments. The example item is 'when navigating u-learning environments, I prefer that they can provide useful feedback to guide learning at the right time and in the right place'.
- The CO-SN scale measures perceptions of the extent to which students prefer to have opportunities to explain and talk about their ideas to other students in u-learning environments. The example item is 'when navigating u-learning environments, I prefer that I can ask other students to explain their ideas'.
- The CO-IL scale measures perceptions of the extent to which students prefer to have opportunities to be engaged in IL in u-learning environments. The example item is 'when navigating u-learning environments, I prefer that I can find out answers to questions by investigation'.

### **2.3. Data Analysis**

The PUEQ was utilized in this study. Exploratory factor analysis was used to clarify the questionnaire structure. Accordingly, the validity and reliability of the questionnaire was also evaluated. Moreover, an independent t-test was conducted to explore whether there were differences between the two major groups of students. In addition, Pearson's correlation analysis was performed on the students' responses to PUEQ for the students.

## **3. Results**

### **3.1. Exploratory Factor Analysis for the PUEQ**

In this study, the researchers firstly conducted exploratory factor analysis (EFA) to clarify the structure of students' perceptions about U-learning environment. In the analysis process, we made use of the extraction method of principal

component analysis, and the rotation method was *varimax*. An item was retained only if it loaded greater than 0.40 on the relevant factor. As shown in Table 1, the results derived from the exploratory factor analysis method reveal eight factors among the items (to match the theoretical framework).

Therefore, there were 28 items retained, and accounting for 66.69% of the total variance explained. The reliability (Cronbach's alpha) coefficients of the eight factors are 0.89, 0.78, 0.71, 0.78, 0.85, 0.75, 0.81, and 0.86, respectively and the overall alpha coefficient is 0.95. Accordingly, these scales proved to be highly reliable for measuring the students' preferences for U-learning environment.

### 3.2. Students' Scores on the PUEQ Scales

Table 1: Students' scores on the PUEQ scales

| Scale  | Mean | SD   | Range   |
|--|------|------|---------|
| Ease of use scale, Technical(T-EU)           | 4.36 | 0.67 | 1.0-5.0 |
| Continuity scale, Technical (T-CON)          | 4.10 | 0.70 | 1.0-5.0 |
| Relevance scale, Content (C-RE)              | 4.17 | 0.61 | 1.0-5.0 |
| Adaptive content scale, Content (C-AC)       | 4.41 | 0.58 | 1.0-5.0 |
| Multiple source scale, Content (C-MS)        | 4.16 | 0.62 | 1.0-5.0 |
| Timely guidance scale, Cognitive (CT-TG)     | 4.22 | 0.60 | 1.0-5.0 |
| Student negotiation scale, Cognitive (CT-SN) | 3.93 | 0.69 | 1.0-5.0 |
| Inquiry learning scale, Cognitive (CT-IL)    | 4.11 | 0.73 | 1.0-5.0 |

The students' average scores and standard deviations on the PUEQ scales are presented in Table 1. The highest scores of the students were for the C-AC, T-EU, CT-TG, and the lowest was CT-SN.

### 3.3. Differences between Male and Female Students of PUEQ

This study compared whether there were differences in the perceptions about u-learning between male and female students. The results presented in Table 2 showing that there was significant difference in the C-MS scale between male and female students, but no significant difference in the other seven scales. The results showed that the differences between the male and female students were statistically significant. The effect size,  $d = 0.42$ , is medium.

Table 2: Differences between male and female students of PUEQ (M±SD)

|                  | T-EU      | T-CO      | C-RE      | C-AC      | C-MS      | CT-TG     | CT-SN     | CT-IL     |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Male             | 4.34±0.77 | 4.01±0.76 | 4.15±0.61 | 4.42±0.59 | 4.04±0.68 | 4.16±0.67 | 3.94±0.71 | 4.03±0.82 |
| Female           | 4.37±0.56 | 4.20±0.63 | 4.19±0.61 | 4.40±0.57 | 4.29±0.51 | 4.28±0.52 | 3.93±0.66 | 4.19±0.62 |
| <i>t</i> -test   | -.24      | -1.54     | -.40      | .24       | -2.40*    | -1.09     | .09       | -1.29     |
| Cohen's <i>d</i> |           |           |           |           | -0.42     |           |           |           |

Notes: \*  $p < 0.05$ .

### 3.4. Grade Difference of PUEQ

The subjects of this study were divided into four groups: freshmen (n= 26), sophomore (n= 54), junior Year (n = 29), and senior year (n = 25). A series of ANOVA tests were then conducted, and the results are summarized in Table 3.

Table 3: Students' PUEQ: descriptive and ANOVA results.

| Grade(M±SD)   | T-EU      | T-CO      | C-RE      | C-AC      | C-MS      | CT-TG     | CT-SN     | CT-IL     |
|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| (1) Freshman  | 4.62±0.52 | 4.43±0.66 | 4.44±0.49 | 4.69±0.47 | 4.35±0.56 | 4.48±0.49 | 4.18±0.66 | 4.50±0.65 |
| (2) Sophomore | 4.19±0.68 | 3.91±0.63 | 4.05±0.60 | 4.21±0.59 | 3.98±0.65 | 4.07±0.63 | 3.83±0.67 | 3.91±0.79 |
| (3) Junior    | 4.46±0.51 | 4.30±0.62 | 4.34±0.50 | 4.56±0.42 | 4.34±0.50 | 4.37±0.36 | 4.10±0.62 | 4.20±0.59 |

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|              |           |           |           |                      |           |           |           |           |
|--------------|-----------|-----------|-----------|----------------------|-----------|-----------|-----------|-----------|
| (4) Senior   | 4.48±0.55 | 4.04±0.81 | 4.00±0.69 | 4.49±0.55            | 4.19±0.56 | 4.19±0.61 | 3.81±0.67 | 4.15±0.61 |
| F(ANOVA)     | 3.58*     | 4.29**    | 4.15**    | 6.00**               | 3.56*     | 3.94*     | 2.48      | 4.36**    |
| Scheffe Test | (1)> (2)  | (1)> (2)  |           | (1)> (2)<br>(3)> (2) |           | (1)> (2)  |           | (1)> (2)  |

Note:\*\*  $p < 0.01$ , \*  $p < 0.05$

As showed in Table 3, the ANOVA results show that with regard to the students' grade, students do not differ in their preference of CT-SN; but do differ in their perceptions of T-EU, T-CO, C-RE, C-AC, C-MS, CT-TG, CT-IL. Post hoc tests (*Scheffe* tests) further indicated that significant differences could be found in relation to Technical, and C-AC, CT-TG, and CT-IL between first and second year students.

#### 4. Discussion and Conclusion

This study first reports the validation of the Students' Perceptions of U-Learning Environment Questionnaire (PUEQ). A sample of students were asked to report their perceptions of the scale items. PUEQ was found to be reliable and valid based on eight scales for these Chinese university students. The analysis data indicated PUEQ subscales showed satisfactory validity.

As Tsai and colleagues (Tsai et al., 2012) stated, Taiwan undergraduate students had mean score more than 4.06 (the least scale, T-CO) and less than 4.35 (the highest scale, T-EU) in all eight scales. In this study, the university students in Chinese mainland have the different mean score at the different scale. The highest scale is C-AC (the mean score is 4.41, higher than 4.39), and the least scale is CT-SN (the mean score is 3.93, lower than 4.0). The result indicated that students are more caring about the Content and Cognitive, and it means the learning system need to enhance the design in the two aspects.

Table 2 and Table 3 indicated that there were significant differences between different gender and grade students in the preference about u-learning environment. The result is not line with the previous study (Tsai, Tsai and Hwang, 2012). As Tsai et al. (2012) stated, there were no difference between male and female students. This present study indicated that female students wish to obtain more relevant and multiple information than male students. The freshmen may have higher preference for u-learning environment than second year students. Its reason may be they just came into the university and have urgent requirement for web learning. These results can give those designers of u-learning environments more valuable content.

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