Research on Influential Factors of Learning Experience in the Online Open Course

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Abstract. With the rise of the online open course, it is in the spotlight that studying the construction strategy of the online open course from the perspective of learners, and it is becoming more significant to explore the composition and structure of the influential factors of learning experience in the online open course. Based on the ACSI model, this paper classifies the influential factors of learning experience into the course environment and design, individual learning characteristics, the interactivity and learning gain. With the selection of the learners’ gender and undergraduate students as external variables, the relationship between the influential factors of the learning experience in the online open course is verified through questionnaire survey, and the structural model of the influential factors of the learning experience in the online open course is obtained, providing references for exploring the construction strategy of the online open course in domestic universities.

Introduction

The term "experience" has a long history, owning a specific definition and fairly complete research in philosophy, psychology and aesthetics fields. However, in the field of education in China, the systematic study of the learning experience and the teaching practice from the students' perspective were not carried out until 2000. With the rise of the online open course and the release of the “Opinions of the Ministry of Education on Strengthening the Application and Management of the Online Open Course Construction in Colleges and Universities” in April 2015, the online open course in China has developed rapidly and entered into the stage of comprehensive construction application and management [1]. The study of learning experience in China has gradually turned to the study of learning experience in the online open course.

Research Review

American Customer Satisfaction Index Model

In the early 1990s, Anderson and Fornell developed the American Customer Satisfaction Index, which has been supported by statistical results [2, 3]. ACSI model is a kind of satisfaction research model with wide application and high authority [4]. As shown in Fig. 1 below.

![ACSI Model](image)

Figure 1. ACSI Model.

Learning Experience in the Online Open Course

It can be seen that the learning experience have received a significant increasing attention in China in the past 5 years. For example, when Kang Xiaofeng [5] expounded the innovative teaching mode based on mobile intelligent terminals, she took the enhancement of learners’ learning experience as
one of the teaching objectives, etc. More and more scholars have realized that learning experience are of great value to the research on teaching mode, course design and teaching methods.

As the online open course has become a hot topic in the domestic education sector in recent years, the application of learning experience to its construction research has become a trend, and it is virtually important to analyze the relationship between the influential factors of learning experience in the online open course.

The research of Liu Bin and Zhang Wenlan [6] shows that learning gain is at the top, which directly affects the learning experience of online learners; the content and resources are at the bottom, which are the most fundamental and basic factors among all the influential factors; and other factors are in the middle layer, which has an indirect effect on the learning experience of online learners. The study of He Chun [7] shows that the main reason for abandoning learning in the online open course on the halfway is "limited time", that is, the courses’ time flexibility has a certain impact on the learning of the online open course. The research of Hui Zhaoyang [8] shows that there is a strong correlation between online learning effect and learning motivation, between online learning pleasure and social interaction. Zeng Jialing’s [9] study on the influential factors of the distance learners’ satisfaction shows that the learning process has a direct impact on learning satisfaction, and individual learning characteristics such as learning ability, motivation and difficulty indirectly affect learning satisfaction through the association with the learning process.

Research Assumptions

According to the above related research, this paper mainly concerns four influential factors on the learning experience of the online open course, such as course environment and design, individual learning characteristics, interactivity and learning gain. The ACSI model contains 6 indexes, among which customer expectation, perceived quality and perceived value are important influential factors of customer satisfaction [10]. Because the learning experience emphasize the experience of learning process and the result, it only draws on the relationship between the perceived quality, the perceived value and the customer satisfaction, with the perceived quality corresponds to the course environment and design and interactivity, the perceived value corresponds to the learning gain, customer satisfaction corresponds to the learning experience, adding personal learning feature dimensions and taking possible impact of external variables such as learners’ gender and grade into consideration. The relationship model of influential factors to construct learning experience of the online open course is shown in Fig. 2 below.

![Figure 2. The Relationship Model of Influential Factors for Learning Experience.](image)

According to the initially constructed model, the research hypothesis is proposed as follows.

(1) Assumptions related to external variables
   H1: The gender of learners has certain impact on the each influential factors of learning experience;
   H2: The grade of learners has certain impact on the each influential factors of learning experience.

(2) The hypothesis of the relationship between the influential factors of learning experience;
   H3: Course environment and design has a significant impact on individual learning characteristics;
H4: Course environment and design has a significant impact on interactivity;
H5: The course environment can have a significant impact on learning gain;
H6: Interactivity has a significant impact on individual learning characteristics;
H7: Interactivity has a significant impact on learning gain;
H8: Individual learning characteristics have significant impact on learning gain.

Data Sources and Descriptions

Questionnaire Design

Taking the online open course platform of iCourse as an example, this paper designs the questionnaire of learning experience in the online open course independently.

The first part of it adopts the form of single choice to survey the basic information of the respondents mainly from the grade, gender. The second part employs the Richter scale 5 point scoring method, which uses 1, 2, 3, 4 and 5 points respectively to express “strongly disagree, disagree, uncertain, agree, strongly agree.” This part of the design contains a total of 21 topics, measuring from course environment and design, individual learning characteristics, interactivity and learning gain to explore the relationship between influential factors of the learning experience in the online open course.

Data Processing

The questionnaire survey is carried out in W universities in China, and the questionnaire was promoted through QQ, WeChat and other network community channels. The official survey began on September 19, 2018 and lasted one week, with a total of 475 recovered questionnaires.

“Learning experience” refer to the learners' pure subjective feelings in the course of a complete learning process, including the their feelings about the whole learning process[11], thus, the collected questionnaires excluded those who had never participated in or completed open online courses. In the remaining 256 questionnaires, nonstandard ones have also been excluded, getting 246 valid questionnaires, the effective rate of it is 51.8%.

Of the 246 respondents, their gender and grade are shown in Table 1. The number of men and women in the sample accounts for 56.9% and 43.1% respectively, with a relatively balanced sex ratio. The sample is divided by grade, the number of it from freshman is very small, only 4.1%. After interviews with them, it was learned that the period of questionnaire issuance was the time for military training for freshman students, without formal university courses, and few students had studied the online open course before the university, so it can also be speculated that colleges and universities are the main force in the construction of the online open course.

Table 1. Basic Information of Respondents.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Sample</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>10</td>
<td>4.1%</td>
<td></td>
</tr>
<tr>
<td>Sophomore</td>
<td>82</td>
<td>33.3%</td>
<td></td>
</tr>
<tr>
<td>Junior</td>
<td>127</td>
<td>51.6%</td>
<td></td>
</tr>
<tr>
<td>Senior</td>
<td>27</td>
<td>11.0%</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>146</td>
<td>56.9%</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>106</td>
<td>43.1%</td>
<td></td>
</tr>
</tbody>
</table>

Reliability and Validity Analysis of Questionnaire

Reliability Analysis. The Cronbach’s alpha is used in the study. Using the statistical software SPSS to test the reliability of the sample, and the results are shown in Table 2.

From the table above, the reliability coefficients of the four groups of variables, such as course environment and design, individual learning characteristics, interactivity and learning gain, are 0.885 and above, among which the reliability coefficient of interactivity and learning gain is greater than 0.9, which indicates that the results of the questionnaire are very credible.
Validity Analysis. In this paper, the validity test of structural is carried out, taking generally greater than 0.6 KMO value and less than 0.05 Sig. value as the standard. The questionnaire is tested by KMO and Bartlett, and its results are shown in Table 3.

Table 3. KMO and Bartlett Tests.

<table>
<thead>
<tr>
<th>Kaiser-meyer-olkin measure of sufficient degree of sampling</th>
<th>.942</th>
</tr>
</thead>
<tbody>
<tr>
<td>The approximate chi-square</td>
<td>4601.626</td>
</tr>
<tr>
<td>The spherical degree test of Bartlett</td>
<td>df</td>
</tr>
<tr>
<td></td>
<td>210</td>
</tr>
<tr>
<td></td>
<td>Sig.</td>
</tr>
<tr>
<td></td>
<td>.000</td>
</tr>
</tbody>
</table>

As the above table shows, the KMO value is 0.942, thus passing the KMO test, indicating that the variables of the questionnaire are suitable for factor analysis, and the Sig. value is 0.000, with a significant level, indicating that there is a correlation between each variables and the factor analysis is effective.

Data Analysis

This paper mainly adopts SPSS statistical software, employing T test, variance analysis and correlation analysis methods to analyze the data obtained from the questionnaire and validate the research hypothesis.

Hypothesis Test of External Variables

Table 4. Independent-sample T-test Results Report of Gender Influential Factors on Learning Experience.

<table>
<thead>
<tr>
<th>Curriculum environment and design</th>
<th>The Levene test of the variance equation</th>
<th>The T-test of the mean value equation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>Assum ing equal variance</td>
<td>8.854</td>
<td>.003</td>
</tr>
<tr>
<td>Assum ing unequal variance</td>
<td>4.247</td>
<td>.140</td>
</tr>
<tr>
<td>Individual learning characteristics</td>
<td>.265</td>
<td>.607</td>
</tr>
<tr>
<td>Assum ing equal variance</td>
<td>.212</td>
<td>.544</td>
</tr>
<tr>
<td>Assum ing unequal variance</td>
<td>.223</td>
<td>.616</td>
</tr>
<tr>
<td>Inte ractivity</td>
<td>.700</td>
<td>.404</td>
</tr>
<tr>
<td>Assum ing equal variance</td>
<td>.700</td>
<td>.404</td>
</tr>
<tr>
<td>Assum ing unequal variance</td>
<td>.233</td>
<td>.516</td>
</tr>
</tbody>
</table>

Hypothesis Test of the Gender of Learners. In examining the relationship between the learners’ gender and the each influential factors of learning experience, the method of Independent-Sample T test is often adopted. The study uses gender as an independent variable and selects the mean values of course environment and design, personal learning characteristics,
interactivity and learning gain into the test variables, the results are analyzed as shown in Table 4 below.

As shown in Table 4, the F-value variance of the gender and course environment and design is 0.003, less than 0.05, and reaches a significant level, so the P value of the T test is 0.140 when the assumed variance is not equal. The F-value variance of gender and the remaining three projects is greater than 0.05, not reaching a significant level and accepting the assumption of variance homogeneity, the significance of T test is 0.804, 0.860 and 0.819 in individual learning characteristics, interactivity and learning gain, respectively. The P value in T Test is greater than 0.05, indicating learners’ gender has no obvious impact on course environment and design, personal learning characteristics, interactivity and learning gain.

Hypothesis Test of the Grade of the Learners. In the test of the relationship between learners’ grades and the each influential factors of learning experience, due to the grade is divided into four groups of freshman, sophomore, junior, senior, ANOVA is adopted. The independent variable of this test is the learners’ grade, and the dependent variables are the mean values of the course environment and design, personal learning characteristics, interactivity, learning gain, with the analysis results are shown in Table 5 and 6 below.

<table>
<thead>
<tr>
<th></th>
<th>Levene statistic</th>
<th>df1</th>
<th>df2</th>
<th>significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curriculum environment and design</td>
<td>.259</td>
<td>3</td>
<td>242</td>
<td>.855</td>
</tr>
<tr>
<td>Individual learning characteristics</td>
<td>.121</td>
<td>3</td>
<td>242</td>
<td>.948</td>
</tr>
<tr>
<td>Interactivity</td>
<td>2.321</td>
<td>3</td>
<td>242</td>
<td>.076</td>
</tr>
<tr>
<td>Learning gain</td>
<td>1.514</td>
<td>3</td>
<td>242</td>
<td>.212</td>
</tr>
</tbody>
</table>

Table 6. One-way ANOVA of Influential Factors of Learning Experience in Grade.

<table>
<thead>
<tr>
<th></th>
<th>Sum of squares</th>
<th>df</th>
<th>The mean square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curriculum environment and design</td>
<td>(Combination)</td>
<td>3.063</td>
<td>3</td>
<td>1.021</td>
<td>2.117</td>
</tr>
<tr>
<td>Inter-group</td>
<td>116.746</td>
<td>242</td>
<td>.482</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within the group</td>
<td>119.810</td>
<td>245</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual learning characteristics</td>
<td>(Combination)</td>
<td>3.006</td>
<td>3</td>
<td>1.202</td>
<td>2.278</td>
</tr>
<tr>
<td>Inter-group</td>
<td>127.687</td>
<td>242</td>
<td>.528</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within the group</td>
<td>131.293</td>
<td>245</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interactivity</td>
<td>(Combination)</td>
<td>.863</td>
<td>3</td>
<td>.288</td>
<td>.349</td>
</tr>
<tr>
<td>Inter-group</td>
<td>199.407</td>
<td>242</td>
<td>.824</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within the group</td>
<td>200.270</td>
<td>245</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning gain</td>
<td>(Combination)</td>
<td>3.011</td>
<td>3</td>
<td>1.004</td>
<td>1.751</td>
</tr>
<tr>
<td>Inter-group</td>
<td>138.712</td>
<td>242</td>
<td>.573</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within the group</td>
<td>141.723</td>
<td>245</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The homogeneity of variance test table shows that the significance probability is 0.855, 0.948, 0.076, and 0.212, all greater than 0.05, indicating that there is no significant difference in the variance between the groups in the grade of college students at 0.05 level, and the variance analysis could be carried out. The results of variance analysis in Table 6 show that the corresponding probability of the F value of inter-group variance analysis about freshman, sophomore, junior, senior is 0.099, 0.080, 0.790, 0.157, respectively, which are greater than 0.05, indicating the learners’ undergraduate grade has no significant influence on the each influential factors of learning experience. However, in this research, learners only take undergraduate students into account. In fact, the learners of the online open course are not limited to undergraduate students. The impact of the online open course learners’ age and education on learning gain remains be explored in the future.
Hypothesis Test of the Relationship between the Influential Factors of Learning Experience

This paper selects Pearson correlation coefficient as the determining index of correlation between variables. Using the mean value of course environment and design, individual learning characteristics, interactivity and learning gain as the research variables, the Bivariate correlations analysis is carried out, and the results are shown in Table 7 below.

Table 7. Pearson Correlation Coefficient Matrix and Correlation Test Results Report.

<table>
<thead>
<tr>
<th></th>
<th>Curriculum environment and design</th>
<th>Individual learning characteristics</th>
<th>Interactivity</th>
<th>Learning gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curriculum environment and design</td>
<td>Pearson correlation: 1.00</td>
<td>.644**</td>
<td>.540**</td>
<td>.640**</td>
</tr>
<tr>
<td></td>
<td>Significance (unilateral): .000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N: 246</td>
<td>246</td>
<td>246</td>
<td>246</td>
</tr>
<tr>
<td>Individual learning characteristics</td>
<td>Pearson correlation: .644**</td>
<td>1.00</td>
<td>.669**</td>
<td>.802**</td>
</tr>
<tr>
<td></td>
<td>Significance (unilateral): .000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N: 246</td>
<td>246</td>
<td>246</td>
<td>246</td>
</tr>
<tr>
<td>Interactivity</td>
<td>Pearson correlation: .540**</td>
<td>.669**</td>
<td>1.00</td>
<td>.752**</td>
</tr>
<tr>
<td></td>
<td>Significance (unilateral): .000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N: 246</td>
<td>246</td>
<td>246</td>
<td>246</td>
</tr>
<tr>
<td>Learning gain</td>
<td>Pearson correlation: .640**</td>
<td>.802**</td>
<td>.752**</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Significance (unilateral): .000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N: 246</td>
<td>246</td>
<td>246</td>
<td>246</td>
</tr>
</tbody>
</table>

**. The correlation was significant at the level of .01 (unilateral).

It can be seen that the correlation coefficient between course environment and design, individual learning characteristics, interactivity and learning gain is 0.664, 0.540 and 0.640 respectively, the significance of single-tail test is 0.000, and the significant level has been reached at 0.01 level, which shows that course environment and design has strong positive correlation between individual learning characteristics, interactivity and learning gain. The Pearson correlation coefficient between the individual learning characteristics and the learning gain is 0.802, with the binary number marker, which shows that the individual learning characteristics can have a significant impact on learning gain. Along with the optimization of individual learning characteristics, such as the preference of network learning, learning motivation, learning interest, self-management ability, and increased level of effort, learners’ experience of gain in the online open course can get increased significantly. With interactivity as an independent variable, it can also be seen from the table that the Pearson correlation between interactivity and individual learning characteristics is 0.669, 0.752, respectively, and the significance of the test is 0.000, which shows that interactivity has a significant impact on individual learning characteristics and learning gain. The learner's personal learning characteristics and learning gain will get improved when the interactivity of the online open course is enhanced.

Validation Results of the Study Hypothesis

Based on the above inspection and analysis, the validation results of this research hypothesis are shown in Table 8 below.

According to the validation results of the research hypothesis, the structural relationship model of the influential factors of learning experience in the online open course is shown in Fig. 3 below.
Table 8. Results of Research Hypotheses Verification.

<table>
<thead>
<tr>
<th>Research hypothesis</th>
<th>The verification results</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1 The gender of learners has certain impact on the learning gain</td>
<td>negative</td>
</tr>
<tr>
<td>H2 The grade of learners has certain impact on the learning gain</td>
<td>negative</td>
</tr>
<tr>
<td>H3 Curriculum environment and design have a significant impact on individual learning characteristics</td>
<td>positive</td>
</tr>
<tr>
<td>H4 Curriculum environment and design have a significant impact on interactivity</td>
<td>positive</td>
</tr>
<tr>
<td>H5 The curriculum environment can have a significant impact on learning gain</td>
<td>positive</td>
</tr>
<tr>
<td>H6 Interactivity has a significant impact on individual learning characteristics</td>
<td>positive</td>
</tr>
<tr>
<td>H7 Interactivity has a significant impact on learning gain</td>
<td>positive</td>
</tr>
<tr>
<td>H8 Individual learning characteristics have significant impact on learning gain</td>
<td>positive</td>
</tr>
</tbody>
</table>

Fig. 3. The Relationship Model of Influential Factors for Learning Experience.

Suggestions

From the learners’ perspective, based on the theoretical research of ACSI model and related literature, this paper puts forward 8 research hypotheses on the relationship between the influential factors of the online open course’s learning experience, and uses SPSS to verify one by one according to the survey results of the self-designed questionnaire about learning experience in the online open course. This research mainly obtains the following findings:

1. There is no significant relationship between the gender of the online open course learners and the each influential factors of learning experience;
2. Among the influential factors of learning experience, the course environment and design, personal learning characteristics and interactivity have a significant impact on the learning gain;
3. The course environment and design is at the bottom. Not only it can directly affect the learning gain, but also affect the individual learning characteristics and interactivity;
4. The learning gain is at the top of the influential factors, which plays the most direct role in learners’ learning experience;
5. The characteristics and interactivity of individual learning are in the middle layer of the learning experience structure, in which the individual learning characteristics have a more obvious influence on the learning gain than the interactivity. And there are complex structures within the middle layer, such as interactivity, which will have a certain impact on the characteristics of personal learning.

Based on the above research conclusions, this paper puts forward the following suggestions on the construction of the online open course in Chinese colleges and universities:

1. Optimize the course environment and pay attention to course design
   - Course environment and design is the basic elements of the online open course learning experience. In optimizing the course environment, we need to strengthen the scientific management of the communication area, supplemented by the technical support of the platform to create a good course learning atmosphere if necessary.
   - In curriculum design, a wealth of curriculum content and resources is the basic requirements, the organization of curriculum content and resources should carry out appropriate tailoring, relevance design and hierarchical design; Curriculum learning progress design for learners should retain a certain degree of space for self-regulation; Learning evaluation assessment should pay attention to
the principle of fairness and justice, and take a variety of evaluation methods according to the type of test.

(2) Create an interactive atmosphere and improve the quality of interaction
The interactivity of the online open course is an important influential factor of the learning experience. Interaction is not limited to forum of the online open course platform, the interaction between teacher-student and student-student can also be achieved through QQ, WeChat group and other social platforms. The construction of the online open course can also take the teaching assistant system into consideration, properly expanding the teaching assistance team and scale of the online open course, improving the quality of the teaching assistance team. At present, the relatively effective method to promote the student-student interaction is to count the interaction rate into the assessment standard, so as to stimulate the learner’s enthusiasm for interaction.

(3) Take individual differences into account and guide learning activities
The learners’ individual learning characteristics will not change easily, so we can improve the course environment and design to realize the positive guidance effect to students, such as recommending suitable reading time for reading materials, declaring teaching objectives, making the content more vivid, etc.; through the improvement of platform technology, a teacher monitoring system can be added to monitor students’ real-time learning activities, which is convenient for teachers to carry out advanced guidance [12].

(4) Focus on learning gain and enhance the learning experience
In the course of curriculum construction, we should attach importance to students’ learning gain, and reasonably increase the proportion of learning experience in the development of online open curriculum evaluation system. We should taking the students’ demands as the starting point and the learning gain as the foothold, improving the students’ quality and value experience in the learning process and building the high level, the high quality online open course [13].

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