FACTORS INFLUENCING UNDERGRADUATE STUDENTS' INTENTION TO USE ONLINE EDUCATION PLATFORMS

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The aim of this study is to examine the factors influencing intention to use e-learning platforms in universities in Sichuan, China. Research design, data and methodology: Quantitative methods and data collection A questionnaire was used as a tool to collect sample data. Prior to distributing the questionnaires, the content validity and reliability were assessed using Item-Objective Congruence and pilot testing. Goodness of model fit was analyzed by confirmatory factor analysis and structural equation modeling, and causal relationships between variables were determined for hypothesis testing.

The study found that the conceptual model was able to predict behavioral intention (BI) to use mobile educational platforms in higher education, and that perceived ease of use (PEU) and attitude towards use (ATT) were the two key antecedents of behavioral intention to use mobile educational platforms.

It is concluded that ATT is the strongest factor in direct BI use and that social influence, convenience and expected performance have a significant effect on ATT. Therefore, this study suggests that mobile educational platform developers and higher education administrators should focus on improving the usability factors of mobile educational platforms so that students find the platform useful and further develop good attitudes and behavioral intentions to use mobile educational platforms.

Keywords: online education platform; perceived usefulness; behavioral intention; China

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Introduction

During antiquity, the primary mode of education included the transfer of knowledge via oral means, often facilitated by a master-apprentice relationship (Ghosh, 2022). Following the advent of the printing press, there was a significant increase in the production of books, resulting in greater accessibility and dissemination of educational resources. Classical education and Confucianism had significant importance in the context of China. During the medieval period in Europe, ecclesiastical institutions had authority over education, resulting in a curriculum and instructional resources that mostly revolved on religious subjects (Daun, 2011).

During this era, the use of blackboards and lecterns became prevalent in pedagogical practice (Alexiadou, 2007). The introduction of audio and visual instructional aids, such as tape recorders and slideshows, throughout the early 20th century expanded the repertoire of teaching materials available to educators, therefore enhancing their instructional capabilities and opportunities for engagement.

Since the Spring and Autumn Period, when Confucius established private schools to provide education tailored to individual students' abilities, private school education has served as a foundational model in our country (Deng, 1997). Presently, school-age children in China receive education collectively within classroom settings, and educational models and methods are consistently evolving in tandem with advancements in science, technology, and societal advancements (Deng et al., 2001).

When comparing the mobile education platform to the conventional education paradigm, one notable benefit is its exceptional flexibility and ease. The mobile education platform enables learners to engage in studying at their convenience, regardless of location (Dumford & Miller, 2018).

This flexibility allows individuals to tailor their learning experience to their own rhythms and lifestyle, in contrast to the conventional education paradigm that is constrained by temporal and spatial limitations. Additionally, the mobile education platform offers a diverse range of educational materials. The mobile education platform offers students a diverse range of learning resources, such as renowned educators and well-crafted instructional materials. This surely expands learners' access to a wider array of learning alternatives and chances.

Despite the aforementioned benefits of the mobile education platform, it is inevitable that it has significant drawbacks when compared to the conventional education model. To begin with, the mobile education platform is deficient in facilitating direct interpersonal connection. In the conventional educational framework, there exists a direct and physical exchange of information between educators and learners inside the confines of a classroom, hence facilitating the acquisition of knowledge for students.

Conversely, it is possible that online mobile education platforms might impede learners' access to prompt feedback and assistance in some instances. Mobile education platforms have challenges in providing practical possibilities and may result in a relatively poor learning impact for courses that involve hands-on operations. Mobile education platforms need learners to possess certain abilities and meet certain financial prerequisites.

Throughout the COVID-19 pandemic, governments worldwide have implemented many strategies, such as promoting remote work and advocating for social distancing, in order to mitigate the adverse effects of the COVID-19 virus on individuals.
China, as the most populated nation globally, has implemented strategies to promote remote work, minimize outdoor activities, and mitigate the occurrence of widespread outbreaks of the virus. The implementation of this isolation strategy makes it impossible for a significant proportion of pupils to attend school for their customary rigorous study.

With the recent and significant advancements in China's infrastructure construction, there has been a steady increase in the number of mobile base stations as a crucial component of this development (China Internet Network Information Center (CNNIC), 2023). Consequently, an increasing number of households and businesses have gained access to broadband internet, resulting in a widespread adoption of internet connectivity. The quantity of broadband access ports has seen a consistent upward trend in recent years, as depicted.

Sichuan is situated in the southwestern region of China. In all, there exists a sum of 132 universities, including 81 state universities and 51 private universities.

**Literature review**

**Perceived usefulness**

A commonly accepted notion is that the use of technology enhances job performance. Perceived usefulness refers to the degree to which an individual believes that the use of a certain technology will enhance their own performance. Individuals often make use of or refrain from using an application based on their perceived impact on enhancing their performance.

As for online education, perceived usefulness is often defined to assess students' attitudes towards and use of online education platforms. The concept of perceived usefulness was first defined by (Davis, 2009). From these supported studies, the following hypothesis has been formulated:

H1: perceived usefulness has significant impact on behavioral intention of mobile learning platform

**Perceived ease of use**

Perceived ease of use is defined as the degree of convenience and comfort felt by users during the use of products or services (Davis, 1989). In the field of education, this term is regarded as students' perceived challenges of educational tools, platforms or applications used in the learning process.

Abdullah et al. (2016) through empirical investigation, it is found that students' perceived usefulness and perceived ease of use of online education platforms have a significant positive impact on their willingness to use. Several studies have shown that certain factors have an impact on students' perception of the utility and convenience of use of online education platforms, such as personal characteristics, educational background, technical ability, etc. From these supported studies, the following hypothesis has been formulated:

H2: perceived ease of use has significant impact on behavioral intention of mobile learning platform

H3: perceived ease of use has significant impact on Perceived usefulness of mobile learning platform
Facilitating condition

The assumption is made that there is enough infrastructure in place to facilitate the use of the technology. Infrastructure encompasses several elements such as knowledge, administration, organization, and technical help. The presence of available resources has been identified as an enabling factor in the deployment of digital learning platforms (Bakar & Razak, 2014). Facilitation criteria refer to "the degree to which individuals believe that the organizational and technical infrastructure exists to support the use of the system".

These studies have led to the following hypothesis:

H4: social influence has significant impact on attitude toward of mobile learning platform

H5: facilitating condition has significant impact on attitude toward of mobile learning platform

Attitude

Attitude, within the field of psychology, pertains to the subjective evaluation, viewpoint, and behavioral tendencies of individuals. Personal assessment of technology use and the manner in which a stimulus is approached are influenced by individual perspectives (Abdel-Wahab, 2008). Attitude is defined as the sum of an individual's evaluation, belief and emotional response to a certain object or event, it is a relatively stable psychological tendency and plays a role in guiding behavior.

Fishbein & Ajzen (2011) proposed a theoretical model called "belief-attitude-intention-behavior" model. They believe that the behavior of teachers and students is determined by their intentions, which in turn is jointly determined by the attitudes and subjective learning norms of teachers and students. These investigations lead to conclusion of the hypothesis as follow:

H6: performance expectancy has significant impact on attitude toward of mobile learning platform

H7: attitude has significant impact on behavior intention of mobile education platform.

Research methodology

Research framework model

The task-technology fit (TTF) theory provides a way to quantify the effectiveness of technology in a system by evaluating the fit between technology and the tasks it designed to support (Gan et al., 2016). This theory has gained widespread acceptance and is utilized in various capacities in fields such as e-commerce, gaming and education.

The first theoretical framework proposed by Gan et al. in 2017 supports the significant impact of individual learners' attitudes towards mobile education platforms on the use of online education platforms for autonomous learning.

The research conceptual framework is proposed as following Fig 1.
This study aims to explore the key factors influencing behavioral intentions to use online education platforms in higher education in Sichuan, China, and to explore the causal relationships between all the variables in the conceptual framework of the study.

**Methodology**

This study uses empirical analysis and quantitative methods, using a questionnaire as a tool to collect data from a sample of the target population. Prior to large-scale data collection, the content validity and reliability of the questionnaire were tested using objective consistency (IOC) and Cronbach's alpha pilot tests. After reliability testing, the online questionnaire was distributed to sophomore, junior and senior university students in five higher education institutions in Sichuan, China.

Respondents were required to have more than one year of LMS work experience.

This study utilizes structural equation modeling, which encompasses the analysis of both the measurement model and the structural model to derive research hypothesis outcomes.

Confirmatory factor analysis (CFA) is used to validate the measurement model. The study included measures of reliability, convergent validity, and discriminant validity. The last step involves the use of structural equation modeling (SEM) to investigate the structural model pertaining to causal linkages among various structures.

**Population and sample size**

The target population of this study was undergraduate students from five higher education schools in Sichuan Province, China, who had more than one year of learning experience in online education.

A priori sample size calculator for SEM, the minimum recommended sample size for 7 latent variables and 30 observed variables at 0.05 is 425.

The questionnaire was therefore distributed and tested 500 times.
Sampling technique

Several sampling techniques, including judgmental sampling and stratified random sampling, were used to size and select the sample. The judgmental sampling method was used to select five higher education institutions in five different regions of Sichuan, China, and then the stratified random sampling method was used to determine the sample size of each institution or sample stratum, as shown in Tab. 1.

Table 1 - Population and sample size
(made by the authors)

<table>
<thead>
<tr>
<th>Names of university</th>
<th>Total number of undergraduate students</th>
<th>The percentage of the target population</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sichuan University</td>
<td>37,564</td>
<td>28.15%</td>
<td>141</td>
</tr>
<tr>
<td>University of Electronic Science and Technology of China</td>
<td>19,853</td>
<td>14.88%</td>
<td>74</td>
</tr>
<tr>
<td>Southwestern University of Finance and Economics</td>
<td>15,800</td>
<td>11.84%</td>
<td>59</td>
</tr>
<tr>
<td>Chengdu University of Technology</td>
<td>30,161</td>
<td>22.60%</td>
<td>113</td>
</tr>
<tr>
<td>Xihua University</td>
<td>30,056</td>
<td>22.52%</td>
<td>113</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>133,434</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>500</strong></td>
</tr>
</tbody>
</table>

Results and discussion

Demographic information

Demographic information collected from respondents included gender and year of survey. The questionnaire was administered to 500 undergraduate students at five selected higher education institutions; the undergraduate respondents included 312 females and 188 males, representing 62.4% and 37.6% respectively. The undergraduate respondents included 161 sophomores (32.2%), 198 juniors (39.6%) and 141 seniors (28.2%).

Table 2 – Demographic characteristics of respondents (N=500)
(made by the authors)

<table>
<thead>
<tr>
<th>Demographic and General Data (N=500)</th>
<th>undergraduate Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>188</td>
<td>37.6%</td>
</tr>
<tr>
<td>Female</td>
<td>312</td>
<td>62.4%</td>
</tr>
<tr>
<td>Year of Study</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sophomore</td>
<td>161</td>
<td>32.2%</td>
</tr>
<tr>
<td>Junior</td>
<td>198</td>
<td>39.6%</td>
</tr>
<tr>
<td>Senior</td>
<td>141</td>
<td>28.2%</td>
</tr>
</tbody>
</table>

Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis (CFA) serves as a central starting point within the SEM framework. The reliability and validity of both variables can be assessed using CFA. Convergent validity can be assessed using statistics such as Cronbach's alpha reliability, factor loadings, average variance extracted (AVE) and composite reliability (CR) (Fornell & Larcker, 1981).
Factor loadings greater than 0.50 are considered highly significant. In this study, all item loadings for individual constructs exceeded 0.50, with most exceeding 0.70, ranging from 0.697 to 0.935, as shown in Tab. 3. The recommended threshold for Composite Reliability (CR) is 0.70 or greater, while Average Variance Extracted (AVE) is recommended to be greater than or equal to 0.4 (Fornell & Larcker, 1981; Hair et al., 1998). Since the CR values in Table 3 are greater than 0.7 and the AVE values greater than 0.5, all estimates are statistically significant.

Cronbach's alpha is a technique for assessing the internal consistency of items (Cronbach, 1951). Cronbach's Alpha values should ideally be 0.7 or higher to indicate acceptable reliability.

All Cronbach's Alpha values in this study exceed the required threshold of 0.7, as shown in Tab. 3. The discriminant validity appears to be satisfactory as shown in Table 4. The square root of the AVE for all variables is greater than the inter-factor correlations, and the fit indices in Tab. 4, including CMIN/DF, GFI, AGFI, NFI, CFI, TLI and RMSEA, all exceed acceptable values, attesting to the goodness of fit of the measurement model.

Table 3 - Discriminant Validity
(made by the authors)

<table>
<thead>
<tr>
<th></th>
<th>PU</th>
<th>PEU</th>
<th>SI</th>
<th>FC</th>
<th>PE</th>
<th>ATT</th>
<th>BI</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PU</td>
<td></td>
<td>0.857</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEU</td>
<td>0.633</td>
<td>0.839</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI</td>
<td>0.69</td>
<td>0.647</td>
<td>0.826</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FC</td>
<td>0.627</td>
<td>0.577</td>
<td>0.613</td>
<td>0.843</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE</td>
<td>0.726</td>
<td>0.63</td>
<td>0.823</td>
<td>0.645</td>
<td>0.844</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATT</td>
<td>0.664</td>
<td>0.643</td>
<td>0.685</td>
<td>0.601</td>
<td>0.813</td>
<td>0.849</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BI</td>
<td>0.581</td>
<td>0.583</td>
<td>0.557</td>
<td>0.641</td>
<td>0.624</td>
<td>0.678</td>
<td>0.876</td>
<td></td>
</tr>
</tbody>
</table>

Note. The diagonally listed value is the AVE square roots of the variables

In this study, the collected data was analyzed using structural equation modeling (SEM). SEM has a number of advantages. Firstly, it allows for the exploration of dependency relationships.

Secondly, it allows for the examination of casual relationships between latent and observed variables. Third, it uses observed variables with random error to provide more accurate measurement results. Fourth, it uses multiple indicators to measure latent variables. Finally, it allows hypotheses to be tested at the construct level rather than just at the item level.

The goodness of fit of the structural model was assessed as shown in Tab. 4.

The corresponding statistics were CMIN/DF = 2.237, GFI = 0.898, AGFI = 0.877, NFI = 0.937, CFI = 0.964, TLI = 0.960, RMSEA = 0.050.

All goodness of fit indices are above acceptable levels, confirming the adaptability of the model.
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Table 4 - Goodness of Fit
(made by the authors)

<table>
<thead>
<tr>
<th>FitIndex</th>
<th>Acceptable Criteria</th>
<th>CFA Value</th>
<th>SEM Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMIN/DF</td>
<td>&lt; 3.00</td>
<td>5.120</td>
<td>2.237</td>
</tr>
<tr>
<td>GFI</td>
<td>≥ 0.80</td>
<td>0.777</td>
<td>0.898</td>
</tr>
<tr>
<td>AGFI</td>
<td>≥ 0.80</td>
<td>0.740</td>
<td>0.877</td>
</tr>
<tr>
<td>NFI</td>
<td>&gt; 0.90</td>
<td>0.852</td>
<td>0.937</td>
</tr>
<tr>
<td>CFI</td>
<td>&gt; 0.90</td>
<td>0.877</td>
<td>0.964</td>
</tr>
<tr>
<td>TLI</td>
<td>&gt; 0.90</td>
<td>0.866</td>
<td>0.960</td>
</tr>
<tr>
<td>RMSEA</td>
<td>≤ 0.08</td>
<td>0.091</td>
<td>0.050</td>
</tr>
</tbody>
</table>

Note. CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = goodness-of-fit index, AGFI = adjusted goodness-of-fit index, CFI = comparative fit index, NFI = normalized fit index, and RMSEA = root mean square error of approximation.

Research hypothesis testing result
The strength of the relationship between the independent and dependent variables, as stated in the hypotheses, is assessed using regression coefficients or standardized path coefficients.

Table 5 - Hypothesis result of the structural model
(made by the authors)

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Standardized Coefficients(β)</th>
<th>t-value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Perceived usefulness has significant impact on behavioral intention of mobile learning platform</td>
<td>0.163</td>
<td>2.952*</td>
<td>Supported</td>
</tr>
<tr>
<td>H2: Perceived ease of use has significant impact on behavioral intention of mobile learning platform</td>
<td>0.202</td>
<td>3.692*</td>
<td>Supported</td>
</tr>
<tr>
<td>H3: Perceived ease of use has significant impact on Perceived usefulness of mobile learning platform</td>
<td>0.649</td>
<td>13.245*</td>
<td>Supported</td>
</tr>
<tr>
<td>H4: Social influence has a significant impact on attitudes toward mobile learning platforms</td>
<td>0.037</td>
<td>0.550*</td>
<td>Supported</td>
</tr>
<tr>
<td>H5: Facilitating conditions has a significant impact on the attitude toward mobile learning platforms</td>
<td>0.133</td>
<td>3.283*</td>
<td>Supported</td>
</tr>
<tr>
<td>H6: Performance expectancy has a significant impact on behavior intentions of mobile learning platforms</td>
<td>0.682</td>
<td>9.409*</td>
<td>Supported</td>
</tr>
<tr>
<td>H7: Attitude has significant impact on behavior intention of mobile learning platform</td>
<td>0.503</td>
<td>7.906*</td>
<td>Supported</td>
</tr>
</tbody>
</table>

Note. *Significant at p-value, p<0.05.
For the undergraduate research group, standardized path coefficients (β) and t-values were employed to examine the significance of each variable. Based on Table 5.22 and Figure 5.7, the results indicated the following outcomes for the hypotheses: H1 was supported, with a β value of 0.163 and a t-value of 2.952*. H2 was accepted with a β value of 0.202 and a t-value of 3.692*.

Regarding H3, the impact of perceived ease of use on perceived usefulness of the mobile learning platform was significant, as reflected by a β value of 0.649 and a t-value of 13.245*, which was also the strongest significance. H4 received support, with a β value of 0.037 and a t-value of 0.550*. H5 received support, with a β value of 0.133 and a t-value of 3.283*. Furthermore, H6 was accepted, with a β value of 0.682 and a t-value of 9.409*. H7 was supported, with a β value of 0.503 and a t-value of 7.906*.

In summary, for the undergraduate research group, all seven hypotheses exhibited significance and garnered support.

Conclusions and recommendation

Conclusions

The aim of this research is to conduct a thorough analysis of the key determinants that impact the inclination of university students to utilize mobile educational platforms. To investigate the factors affecting behavioral intentions, the study authors put forward seven hypotheses in the conceptual framework. Upon designing and validating the questionnaire's reliability, the researchers distributed the survey to undergraduates with a year or more of study experience across five universities in Sichuan.
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With the collected data, the researchers employed the CFA method to assess and confirm the research model's reliability and validity. The SEM method is utilized to examine and explore the factors that influence the intention of colleges and universities to use mobile educational platforms.

Three key factors directly influence the intention to use mobile educational platforms: perceived usefulness, perceived ease of use, and attitude. Additionally, variables such as perceived ease of use, social influence, facilitating conditions, and performance expectancy also have indirect effects on the intention to use mobile educational platforms. Similarly, three factors directly impact the attitude towards usage: social influence, facilitating conditions, and performance expectancy. Furthermore, the factor that has a direct impact on perceived usefulness is perceived ease of use.

**Recommendation**

The researcher identified basic determinants such as perceived usefulness (PU), perceived ease of use (PEU), social influence (SI), facilitating conditions (FC), performance expectancy (FE) and attitude (ATT) that influence behavioral intention (BI) to use the mobile education platform. This evaluation included five prominent higher education institutions located in different regions of Sichuan.

In order to increase the willingness to adopt mobile educational platforms in higher education, the key factors mentioned above should be developed and strengthened, especially beyond perceived performance expectations. In this study, perceived usefulness and perceived ease of use were identified as the factors that had the most significant predictive effect on behavioral intention to use mobile educational platforms. Therefore, it is important to highlight the importance of increasing the usefulness and ease of use of the system.

This means that students are more likely to use a mobile education platform if they perceive it to be useful for enhancing learning and improving academic performance. Course developers, faculty and management of higher education institutions should ensure that the functionality provided when using mEd platforms should be responsive, flexible, accurate and relevant to learning. Quality technical support should also be included, so adequate training is needed to improve the service levels of engineers and administrators to help learners engage more effectively in online courses and increase their willingness to adopt the mEd platform.

The benefits of the platform, its operational procedures and other support facilities should be promoted to students through training or media communications. This proactive approach can increase awareness and recognition among students, thereby stimulating or increasing their positive attitudes and likelihood of using the moving education platform in their learning process.

In brief, this research elaborates on the determinants of undergraduates' and postgraduates' willingness to use mobile education platforms. The study offers a chance for mobile education platform developers and senior executives at tertiary institutions to recognize the factors that affect the students' decision and implement them in their projects and investments and to maximize online learning platforms' full potential.

**Limitations and further study**

All of this study may have some shortcomings and the following are some of the possible shortcomings as well as suggestions for improvement.
First, sample selection bias. The study selected a sample of students from specific schools, districts, or age groups, which may result in limited generalization of the findings. Improvements could be made by expanding the sample to encompass students from different backgrounds and characteristics to increase the external validity of the study.

Second, self-report bias. Students may respond to questionnaire questions with recall bias, social desirability, and other issues that result in their responses being less than accurate. To minimize this bias, the use of objective data tracking, such as platform usage logs and academic performance, could be considered.

Third, long-term effects are missing. Some studies may only focus on the influencing factors in the short term and ignore the changes and effects of students' long-term use of mobile education platforms. Improvement methods include conducting tracking studies to explore the changes in students' attitudes and behaviors after using the platform for a period of time.

In conclusion, the research on the influencing factors of students' use of mobile education platforms requires comprehensive consideration of various factors, selection of appropriate research methods and tools, and continuous improvement of the research design in order to obtain more accurate and comprehensive research results.

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