A STUDY OF FACTORS INFLUENCING STUDENTS’ ENGAGEMENT IN COMPETITIONS IN CHENGDU, CHINA

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The purpose of this study is to investigate into factors that influence students’ intention and behavior in participating in competition. The research adopted quantitative approach and proposed a conceptual framework based on the theory of reasoned action, the technology acceptance model and the theory of planned behavior, and examined into the relationship among perceived ease of use, perceived usefulness, attitude, subjective norms, perceived behavioral control, intention and behavior. The questionnaire is adapted and distributed to university students and statistical analysis was done after data was collected. The CFA approach and structural equation model was adopted in the analysis process. The finding indicated that possible ways to improve the organization of the competition on the organizers and teachers’ side were given so that students can continuously strengthen their motivation in participating in competitions so as to reach the goals set by policy-makers.

Key words: student competition; student engagement; university students; co-curricular activity

Theoretical basics

Cambell et al. (2000) mentioned that competitions were first adopted by the Russian and followed by European countries and the US to identify students with specific gifted
talents who was excellent in a particular scientific or engineering subject can enter the area at a relatively low cost. It is recommended that because of the cost-effectiveness of competitions, the approach should be more widely used internationally, especially in developed countries so as to nurture talents (Cambell, 2000).

Kondratenko et al. (2022) mentioned that during the process of competition, students’ potential to win and the possibility of bigger plays to student talent and creative thinking are enhanced as students tried to achieve their goals.

Kolb (1984) stated that knowledge comes from experience while the process of learning is a process of experience transforming into knowledge.

Competition is a very important co-curricular activity that can help students to gain competencies (Maier-Lytle et al., 2010). In the study of Roncariati et al. (as cited in Firmin et al., 2009), it is concluded that compared with traditional courses, competition among groups can improve students’ performance.

Carter et al. (2019) mentioned that case study competitions are regarded as a tool that enable students with meaningful learning experiences while at the same time enable the teachers to evaluate on student learning and comprehensive development.

Erbil & Dogan (2012) mentioned that architectural design competitions can help the students to improve their analytical and critical thinking, communication, as well as necessary computer skills.

Simmons et al. (2018) discussed that participating an engineering competition is very popular among engineering students, as they may be allowed to design and build a robot, vehicle, or other devices and communicate with students from different schools.

Wei et al. (2023) emphasis on the responsibility on the teachers’ side in encouraging students’ engagement so that students’ potential of innovation can be activated, students’ innovative ability can be practiced and scientific research and development foundation can be laid.

Researches have been done in terms of students’ engagement of competitions as part of a course (Firmin et al., 2009). Studies has also been done on competitions among students of arts (Kondratenko et al., 2022), physical education, architectural design (Erbil & Dogan, 2012), and business (Damnjanović et al., 2018; Chen et al., 2018; Lynch, 2022), while there are relatively few studies on students of generally science or engineering.

Nowadays in China, much attention has been drawn to student competitions such as the China International “Internet+” College Students Innovation and Entrepreneurship Competition, “Challenge Cup” National Extracurricular Academic and Technological Works Competition for College Students, Chinese College Student Entrepreneurship Plan Competition, among others.

The competitions are carried out to promote student innovation and the ability to transform what they have learnt to paper-works or projects that may actually been adopted by the industry or companies, and to foster entrepreneurship among university students. Such competitions have seen remarkable success (Zuo et al., 2022), yet to further motivate the students and enhance the quality of competition outcomes remain an issue to be addressed.

In this study, the author will adopt quantitative study by distributing questionnaires to university students that have access to such competitions and examine into factors that influence their intention and behavior in participating in competitions. The conceptual framework is drawn from the technology acceptance model and the theory of planned behaviors and the items of the questionnaire are adapted from previous studies.
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Literature Review

Zakour (2009) defined perceived ease of use as the perception of a person on how effortless the target system can be. According to Letchumanan & Tarmizi (2011), perceived ease of use is among the factors that cause perceived usefulness, and external variables can cause direct influence on both of the two elements. Cheng et al. (2019) found that perceived ease of use influenced perceived usefulness.

Gómez-Ramirez et al. (2019) inspected the aspects that influenced students’ adoption of mobile learning with TAM and TPB, concluded that perceived ease of use shows influence on students’ attitude. From the implications of these studies, the following hypothesis can be formulated:

H1: Perceived ease of use has significant impact on perceived usefulness.
H3: Perceived ease of use has significant impact on attitude.

According to Zakour (2009), perceived usefulness is defined as a person’s perception on the subjective probability of using a certain system could increase his/her performance in a certain organization context.

Camarero et al. (2012) concluded in the exploratory study of online forums as a collaborative learning tool, that perceived usefulness of information and communication technologies shows a positive impact on student attitude towards learning forums. In this study, the following hypothesis is put forward:

H2: Perceived usefulness has significant impact on attitude.

Behrend et al. (2011) referred attitude as the perceived reflection toward a certain behavior or reaction in terms of its suitability. According to Cronan et al. (2018), attitude is made of both the perception about the consequences of the behavior and the assessment of these consequences, and it is the most important factor that influences the behavioral intention. Cronan et al. (2018) concluded that attitude shows positive and significant influence on intention. The previous study listed above lead to the hypothesis of this study as follows:

H4: Attitude has significant impact on intention.

Ng et al. (2020) defined subjective norms as social impact imposed by people around the individual, such as peers, friends, parents and teachers. Cronan (2018) listed persons that are related to one’s subjective norms, including peers in a group, and parents among other caregivers. Ng et al. (2020) concluded that subjective norm toward advice seeking shows a positive and significant effect on students’ intention to seek advice about institution choices. Drawn from the implications of the previous study, the following hypothesis is raised:

H5: Subjective norm has significant impact on intention.

Stone et al. (2009) referred perceived behavioral control to the perceived degree of whether performing the behavior is easy or difficulty. According to Stone et al. (2009), in their research on academic misconduct predicting, perceived behavioral control were related to intentions significantly. In this study, the following hypothesis is led:

H6: Perceived behavioral control has significant impact on intention.
Bird & Jelinek (1988) defined intention as a state of mind, attention with direction, experience and real action in terms of realizing a concrete objective. When examining the efficacy of the TPB model to predict the cheating intentions and behavior of students, Stone et al. (2009) confirmed that intentions were significantly related to behaviors related to academic misconduct. From the previous implications, the following hypothesis can be formed:

H7: Intention has significant impact on behavior.

Grossman (1973) defined behavior as the action an individual does that may meet certain standards or cultural group. According to Armitage & Conner (2001), the theory of planned behavior and its followers have verified through meta-analyses the intention–behavior path, which shows the influence of intention on behavior. The purpose of the theory of planned behavior model is to predict a variety of human behaviors.

**Research conceptual framework**

Inspired by the theory of reasoned action raised by Fishbein & Ajzen (1975), the technology acceptance mode which was developed by Davis (1989) and the theory of planned behavior put forward by Ajzen (1985), this research developed its conceptual framework. The relationship among perceived ease of use, perceived usefulness and attitude was further illustrated in the research of Boateng et al. (2016).

The relationship among attitude, subjective norms, perceived behavioral control and intention was further demonstrated by Ates (2019). The relationship between intention and behavior was further illustrated by Wombacher et al (2018).

Based on previous three frameworks, the conceptual framework is further developed as follows, as is shown in Fig. 1.

![Figure 1 - Research conceptual framework](compiled by co-authors)
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The research adopted this framework to investigate into factors influencing students’ intentions and behaviors in participating in competitions. The relationships between each variable are studied.

Research methodology

The research adopted quantitative analysis as the major methodology. The main research instrument is questionnaire. A pilot test that covers 50 university students with similar features in Chengdu will be done to test the reliability and validity of the questionnaire. Three experts were invited to do the Item-Objective Congruence test.

The Cronbach’s Alpha value, KMO and Bartlett test were done based on the pilot test. The values were acceptable, which implies that the reliability and validity of the questionnaire are acceptable. On this basis, large scale questionnaire was done.

Non-probability sampling would be chosen in this study, with purposive or judgmental sampling as the first step. Quota sampling, snowball sampling and convenience sampling will be done as the following procedures.

Confirmative factor analysis and structural equation model are among the tools that are commonly used in the measurement of conceptual and theoretical frameworks and hypothesis (Hair et al., 2014). The SPSS software will be used in this study. AMOS confirmative factor analysis will be used at the same time. After making sure of the validity of the data, structural equation model will be adopted to examine the relationship between each variable.

University students in Chengdu that have access to competitions are the target population. And as adapted from “Calculator: A-priori Sample Size for Structural Equation Models. Free Apriori Sample Size Calculator for Structural Equation Models” by Sober (2006), at least 425 questionnaires need to be collected. Therefore, in this study, no less than 450 questionnaires would be distributed for valid responses.

The questionnaires are distributed according to the previous procedures to university students from July to August in 2023. In the first questions, we made sure that students that have access to competitions can proceed in the survey. The respondents need to start from the screening questions to make sure that they meet all the requirements of the questionnaire before they continue with the following questions of the questionnaire.

Results

A total of 463 respondents were involved in this survey and the demographic profile is shown in Tab. 1.

According to the result, the questionnaire covers 247 male students and 216 female students, representing 53.35% and 46.65% of the total population.

Meanwhile, among the respondents, there are 83 first year students, covering 17.93% of the survey; 110 second year students, covering 23.76%; 174 third year students, covering 37.58%; 86 fourth year students, covering 18.57%; as well as 10 students from other grades, including students of the fifth year, covering 0.22%.

The demographic allocation of the survey is in consistent with the proportion of students that may engage in competitions.
Table 1 - Demographic profile
(results of co-authors survey)

<table>
<thead>
<tr>
<th>Variable</th>
<th>characteristics</th>
<th>frequency</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender</td>
<td>male</td>
<td>247</td>
<td>53.35%</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>216</td>
<td>46.65%</td>
</tr>
<tr>
<td>grade</td>
<td>First year</td>
<td>83</td>
<td>17.93%</td>
</tr>
<tr>
<td></td>
<td>Second year</td>
<td>110</td>
<td>23.76%</td>
</tr>
<tr>
<td></td>
<td>Third year</td>
<td>174</td>
<td>37.58%</td>
</tr>
<tr>
<td></td>
<td>Fourth year</td>
<td>86</td>
<td>18.57%</td>
</tr>
<tr>
<td></td>
<td>Others (fifth year et al.)</td>
<td>10</td>
<td>0.22%</td>
</tr>
</tbody>
</table>

Table 2 - Confirmatory factor analysis results
(compiled by co-authors)

<table>
<thead>
<tr>
<th>Variate</th>
<th>Adapted from</th>
<th>Cronbach's Alpha</th>
<th>CR</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived ease of use</td>
<td>Singh et al. (2021)</td>
<td>0.789</td>
<td>0.804</td>
<td>0.579</td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>Singh et al. (2021)</td>
<td>0.802</td>
<td>0.790</td>
<td>0.485</td>
</tr>
<tr>
<td>Attitude</td>
<td>Ng et al. (2020)</td>
<td>0.799</td>
<td>0.800</td>
<td>0.446</td>
</tr>
<tr>
<td>Subjective Norms</td>
<td>Singh et al. (2021)</td>
<td>0.856</td>
<td>0.857</td>
<td>0.500</td>
</tr>
<tr>
<td>Perceived behavioral control</td>
<td>Sanchez et al. (2013)</td>
<td>0.834</td>
<td>0.834</td>
<td>0.501</td>
</tr>
<tr>
<td>Intention</td>
<td>Hair et al. (2013)</td>
<td>0.834</td>
<td>0.845</td>
<td>0.646</td>
</tr>
<tr>
<td>Behavior</td>
<td>Ng et al. (2020)</td>
<td>0.787</td>
<td>0.794</td>
<td>0.563</td>
</tr>
</tbody>
</table>

As can be seen from Tab. 2, the value of Cronbach’s Alpha of all the seven variables are higher than the standard value of 0.7, implying a good internal consistence of constructs as well as their reliability. The combined reliability, or CR values of the variables are also above 0.7. in addition, the AVE values are higher than the standard of 0.4.

The values are all acceptable, indicating good convergence validity of the variables as well as the questionnaire. In can be concluded that the consistency and effectiveness of the survey are good.

In addition, according to Tab. 3, the discriminant validity is satisfactory, as the AVE square root values of each variable are higher than the maximum absolute value of the correlation coefficient between factors.

The validity analysis of the scale was conducted by using KMO and Bartlett's ball test. The test results are shown in Tab. 4, with KMO results of 0.882, greater than 0.8. In Bartlett's ball test, p<0.001 indicates that there are correlation factors between variables, which is suitable for factor analysis.

In this study, AMOS26.0 software was adopted to conduct confirmatory factor tests on the structural validity of the questionnaire and to test the rationality and stability of the questionnaire.
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Table 3 - Discriminant validity
(results of co-authors survey)

<table>
<thead>
<tr>
<th></th>
<th>PU</th>
<th>PEOU</th>
<th>ATT</th>
<th>SN</th>
<th>PBC</th>
<th>INT</th>
<th>BHV</th>
</tr>
</thead>
<tbody>
<tr>
<td>PU</td>
<td>0.761</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEOU</td>
<td>0.261</td>
<td>0.696</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATT</td>
<td>0.317</td>
<td>0.221</td>
<td>0.668</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN</td>
<td>0.301</td>
<td>0.311</td>
<td>0.289</td>
<td>0.707</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBC</td>
<td>0.274</td>
<td>0.221</td>
<td>0.29</td>
<td>0.292</td>
<td>0.708</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INT</td>
<td>0.307</td>
<td>0.271</td>
<td>0.295</td>
<td>0.404</td>
<td>0.327</td>
<td>0.804</td>
<td></td>
</tr>
<tr>
<td>BHV</td>
<td>0.415</td>
<td>0.372</td>
<td>0.459</td>
<td>0.429</td>
<td>0.425</td>
<td>0.413</td>
<td>0.751</td>
</tr>
</tbody>
</table>

Table 4 - KMO and Barlett’s Test Values
(results of co-authors survey)

<table>
<thead>
<tr>
<th>Kaiser-Meyer-Olkin Sample Adequacy</th>
<th>0.882</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barlett Test of Sphericity</td>
<td></td>
</tr>
<tr>
<td>Ki-Square Value</td>
<td>4590.236</td>
</tr>
<tr>
<td>df</td>
<td>325</td>
</tr>
<tr>
<td>p</td>
<td>0</td>
</tr>
</tbody>
</table>

Figure 2 - The structural equation model using AMOS 26 based on the theoretical model of the study
(compiled by co-authors)
Hair et al. (2013) pointed out that goodness of fit helps researcher to make sure whether the model adopted is suitable for the research. The goodness of fit result in the structural equation model is shown in Tab. 5.

### Table 5 - Goodness of fit in the structural equation model
(results of co-authors survey)

<table>
<thead>
<tr>
<th>Index</th>
<th>Acceptable Values</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMIN/df</td>
<td>$&lt; 5$ (Awang, 2012)</td>
<td>1.746</td>
</tr>
<tr>
<td>GFI</td>
<td>$\geq 0.85$ (Sica and Ghisi, 2007)</td>
<td>0.915</td>
</tr>
<tr>
<td>CFI</td>
<td>$&gt; 0.9$ (Hair et al. 2006)</td>
<td>0.946</td>
</tr>
<tr>
<td>IFI</td>
<td>$\geq 0.9$ (Bollen, 1989)</td>
<td>0.946</td>
</tr>
<tr>
<td>RMSEA</td>
<td>$&lt; 0.08$ (Pedroso et al., 2016)</td>
<td>0.040</td>
</tr>
</tbody>
</table>

Note. CMIN/df = the Relative Chi-Square, GFI = the Goodness of Fit Index, CFI = the comparative fit index, IFI = Incremental Fit Index, and RMSEA = Root Mean square error of approximation.

According to the result, the statistic values were CMIN/df=1.746, GFI=0.915, CFI=0.946, IFI=0.946, RMSEA=0.040. The fitting indicators of the structural equation model are all within the reference range, so the fitting effect of this factor model is good.

### Table 6 - Path analysis results
(results of co-authors survey)

<table>
<thead>
<tr>
<th>Hypothetical path</th>
<th>Standardized Path Coefficients ($\beta$)</th>
<th>t-value</th>
<th>P</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEOU → PU</td>
<td>0.363</td>
<td>5.934</td>
<td>***</td>
<td>valid</td>
</tr>
<tr>
<td>PU → ATT</td>
<td>0.155</td>
<td>2.531</td>
<td>0.011</td>
<td>valid</td>
</tr>
<tr>
<td>PEOU → ATT</td>
<td>0.37</td>
<td>5.688</td>
<td>***</td>
<td>valid</td>
</tr>
<tr>
<td>ATT → INT</td>
<td>0.218</td>
<td>3.943</td>
<td>***</td>
<td>valid</td>
</tr>
<tr>
<td>SN → INT</td>
<td>0.374</td>
<td>6.566</td>
<td>***</td>
<td>valid</td>
</tr>
<tr>
<td>PBC → INT</td>
<td>0.244</td>
<td>4.393</td>
<td>***</td>
<td>valid</td>
</tr>
<tr>
<td>INT → BHV</td>
<td>0.546</td>
<td>8.481</td>
<td>***</td>
<td>valid</td>
</tr>
</tbody>
</table>

Note. *** means that the value of p is less than 0.001. T-value refers to critical ratio. S.E. refers to standard error of path coefficient.

As presented in Tab. 6, six of the seven hypotheses were supported.
Perceived ease of use shows direct influence on perceived usefulness, which shows that when the students think that competitions are not so difficult, they are more likely to perceive the usefulness of the approach. Perceived usefulness shows direct influence on attitude, which implies that if when the students perceive the usefulness of competition, their attitude can be more positive. Perceived ease of use shows direct influence on attitude, which means that when the students think that competitions are not so difficult, they show more positive attitude toward the particular approach.

Attitude shows influence on intention, which means that if the students hold a positive attitude, their intention to undertake such approach get enhanced. Subjective norm shows influence on intention, which suggests that if people of importance to the students support their participation, the students’ intention get strengthened.

Perceived behavioral control shows direct impact on intention, which means that if the students believe that they are in control of the process, their intention to participate in competitions get enhanced.

Intention has strong impact on behavior, which implies that of the students has the intention to participate in competitions, their behavior is likely to follow accordingly.

**Conclusion**

The study tries to examine factors that impact students’ intention and behavior in participating in competitions with a survey into university students in Chengdu, China.

The researcher proposed the conceptual framework of this study based on previous studies of Boateng et al. (2016), Ates (2018) and Wombacher et al. (2018).

Seven hypotheses were proposed accordingly and the questionnaire is adapted. The researcher did a pilot test of 50 students and tested the reliability and validity of the
questionnaire and when the result was supportive, distributed the questionnaire to university students of a larger scale in Chengdu, China.

When the data was collected, the researcher adopted CFA approach to test the internal consistency and validity of the constructs. Structural equation model was adopted to examine and analyze relationships of each variable. According to the result, the seven hypotheses were supported and the research objectives can be fulfilled.

The findings of this research can be summarized as follows:

It can be concluded from the result that once the students show the intention to participate in competitions, their behavior is highly likely to follow. Among factors that influence students’ intention, subjective norms show the strongest impact, followed by perceived behavioral control and attitude. Social pressure exerted by people of importance to students, as suggested by Asadi et al. (2020), is the major force that promotes students’ motivation.

Among factors that may influence students’ attitude, perceived ease of use appears to be the most important one as it has obvious impact on both students’ attitude and students’ perceived usefulness, which in turn, impacts students’ attitude, though not as obvious as perceived ease of use itself. Hence it is very important to make things easier for students so as to encourage their participation.

Recommendations

Much attention has been given to the importance of student competitions in its role in promoting student innovation, enhancing student ability and stimulating innovative reforms in all fields. As the result of this study suggests, the recognition of the importance of competitions by people of importance to students shows the most obvious impact on students’ intention. Therefore, existing policies that is made to encourage students with competition awards in graduate programs application, scholarships as well as other honors given because of the competitions should be maintained.

More policies that favor the encouragement of competitions can be introduced for further encouragement. Besides, as perceived behavioral control and attitude also shows impact, it is also recommended that the organization of competitions should make the rules and procedures of the competitions clearer, while universities and teachers need to offer more guidance in terms of necessary information and assistance so that students can feel that the process of competition preparation is under their control.

In terms of strengthen students’ positive attitude toward participation, perceived ease of use seems to be the most important factor. Universities and organizers need to further optimize the procedures of competition organization—make the registration procedures easy so as to achieve wide participation, restrain limitations so as to make it easier for students are possible optimizations that worth trying.

Limitations and further study

In the proceeding of this research, certain limitations were found.

First, this research covers university students in Chengdu, China. Students of other regions were not covered. There is limitation in terms of the scope and sample size of the survey.
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Secondly, competition in general is discussed in the research, while possible differences in different kind of competitions are not discussed. As the differentiation of competition strategies can be seen in different competitions, more targeted research can be done in terms of their participants so as to promote better organization of competitions.

Thirdly, this research mainly adopted quantitative approach, while qualitative strategies are also recommended in addressing better understanding of student intention. Besides, comparison experiments can be done in terms of different types of competitions to get better understanding of student intention and behavior.

References:


Cognition and Exploratory Learning in Digital Age (CELDA 2018), Hungary: Budapest, 363-366.


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Wei, Y., Zhao, N. & Ge, L. (2023). The research on the cultivation of college students' innovation ability based on academic competition. *SHS Web of Conferences*, 166, 01024.


*Paper submitted* 14 June 2023
*Paper accepted for publishing* 21 August 2023
*Paper published online* 30 September 2023