

Analysis of Acceptance of Canvas E-Learning System

Hon Keung Yau, Lok Chung Wu, Ho Yi Tang

Abstract — The current study validated a modified version of a prominent technology acceptance theory called Unified Theory of Acceptance and Use of Technology (UTAUT) in the context of e-learning acceptance by surveying a random sample of undergraduate engineering students to identify and empirically test the major constructs which determine their acceptance of Canvas, a learning management system (LMS) implemented at the university three years ago. Correlational results indicated that students' attitudes toward using Canvas had positive association with performance expectancy, effort expectancy, social influence, and facilitating conditions. It was also found that their behavioural intention to use Canvas had positive relationships with performance expectancy, effort expectancy, social influence, facilitating conditions, and attitude toward using. Performance expectancy had the strongest positive links with attitude towards using and behavioural intention respectively. A slightly surprising result was that all hypotheses regarding students' behaviour of using Canvas were not supported. Results revealed that students generally accepted and incorporated Canvas in their studies. Implications, limitations, and areas for future research of the current study were also discussed.

Index Terms — e-Learning, Learning Management System, UTAUT, Canvas, Technology Acceptance Model

I. INTRODUCTION

A learning management system (LMS), a web-based interactive learning environment or platform in higher education, facilitates customized online learning materials and resources, and automates centralized administration and operations. Communication tools, shared teaching materials and resources, educational assessment, online collaboration and course administration are allowed in LMS [11, 14].

Canvas is an open source cloud-based LMS and adopted popularly in thousands of educational institutions. It has been fully implemented as the unified LMS at one of university in Hong Kong since 2015. It also enables teaching and learning activities in colleges, for instance, accessing teaching materials and resources, course announcements, and discussion with classmates and instructors, etc.

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H. K. Yau is with the Department of Advanced Design and Systems Engineering, City University of Hong Kong, Kowloon Tong, Kowloon, Hong Kong (corresponding author to provide phone: 852-34426158, Fax: 852-34420173, email: honkyau@cityu.edu.hk).

L. C. Wu was with the Department of Advanced Design and Systems Engineering, City University of Hong Kong, Kowloon Tong, Kowloon, Hong Kong (email: lokchwu3-c@my.cityu.edu.hk)

H. Y. Tang was with the Department of Advanced Design and Systems Engineering, City University of Hong Kong, Kowloon Tong, Kowloon, Hong Kong (email: hoyitang4-c@my.cityu.edu.hk).

Performed by the administration division of the university which oversees the implementation of Canvas, a survey revealed that about four-fifths of the respondents found Canvas efficient for their studies while roughly half of them found Canvas helpful in keeping them in touch with teachers and/or classmates and engaging them in active learning. Regarding categorized web usage levels [7], findings revealed that 24.7% reported exclusive use of Canvas, 34.2% reported central use, 25.1% reported integral use, 11.2% reported supplemental use, 3.4% reported minimal use, and 1.4% did not use Canvas at all.

The present study is to investigate the acceptance of Canvas among students in one of Hong Kong university and validate a modified version of Unified Theory of Acceptance and Use of Technology (UTAUT) [13] by conducting a questionnaire survey on Engineering students to identify and empirically study the main constructs which determine their acceptance of Canvas.

II. LITERATURE REVIEW

Proposed by Davis et al. [3], Technology Acceptance Model (TAM) was one of the most fundamental theories to give an explanation for a user's acceptance level of a technological innovation by establishing relationships between two internal beliefs of the user (perceived usefulness and perceived ease of use) and his or her attitude toward using the technology and behavioural intention to use it. This robust and valid model has been extensively used in research in many fields and considered a parsimonious and powerful theory in the IS community [8,9]

According to Venkatesh et al. [13], the Unified Theory of Acceptance and Use of Technology (UTAUT) was formulated based on a systemic review and comparison of eight prominent technology acceptance theories, including TRA, TAM, the motivational model, the theory of planned behaviour, a theory combining TAM and theory of planned behaviour, the model of PC utilisation, the innovation diffusion theory, and the social cognitive theory. Performance expectancy, effort expectancy, social influence, and facilitating conditions are main influencers of a user acceptance of a technology. UTAUT was revealed to account for roughly 70% of the variance in behavioural intention to use a technology and around 50% of the variance in actual usage, outperforming the eight models and thus providing a useful tool for determining the drivers of technology acceptance [13].

Five UTAUT core constructs [3] were Performance expectancy (PE), Effort expectancy (EE), Social influence

(SI), Facilitating conditions (FC) and Behavioural intention to a specific system (BI). In the original UTAUT paper, given the outperformance of the model, Venkatesh et al. [13] suggested that UTAUT might have reached its practical limits to explain technology acceptance and usage in organizations. However, empirical UTAUT studies in e-learning technology acceptance literature generally produced mixed support for the state-of-the-art user acceptance model [5, 10, 12, 13].

The small presence of empirical UTAUT e-learning acceptance research in Hong Kong also received mixed results. Compared to TAM, there was minimal research applying UTAUT as a ground theory to investigate students' adoption of e-learning technologies in Hong Kong. The mixed results in the existing studies about the predictability of technology acceptance using UTAUT determinants indicated that UTAUT still needs further validations and refinements [1].

The hypothesized model in the present study was borrowed from the research performed by Šumak et al. [12], who examined the acceptance of Moodle perceived by IS/IT students from University of Maribor in Slovenia. The rationale for adoption of this model in the current study were, firstly, to better explained relationship among students' attitudes towards Canvas and the different factors influencing their acceptance of Canvas. The hypothesized model was a combination of two most prominent models TAM and UTAUT. In a systemic meta-analysis of e-learning acceptance literature, it was found that TAM and UTAUT together accounted for 90% of the models applied in 42 independent e-learning technology acceptance research [12]. Secondly, in this study, user acceptance theory could be validated through adopting a modified and refined version of UTAUT. Thirdly, this study was performed as a replication of the study conducted by Šumak et al. [12] in a different cultural and organizational context with different subjects to inspire new e-learning acceptance research in Hong Kong.

Despite the attitude toward using a technology not being a determinant of behavioural intention in UTAUT, it was a major influencer of behavioural intention in TAM, which was the most widely-used technology acceptance model in the field of IS. As a result, the attitude toward using a technology was considered and included in the hypothesized model (see Figure 1).

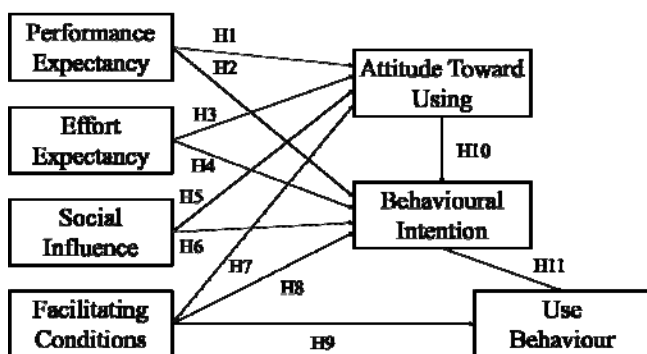


Figure 1. Proposed Hypothesized model

Performance expectancy (PE) is defined as the extent to which a student perceives that using Canvas will improve own performance. Effort expectancy (EE) is defined as the extent of ease associated with the use of Canvas. Social influence (SI) refers to the a student perceives that important people think that he or she should adopt Canvas. Facilitating conditions (FC) is defined as the extent to which a student believes that necessary skills, technical equipment, and organizational support to use Canvas. Attitude toward using (ATU) is contextualize as a student's overall affective feeling of using Canvas with respect to student's enjoyment, pleasure, liking, and joy. Behavioural intention (BI) is a strength of student's intention to use Canvas during learning. The frequency of Canvas use was an estimation of the hypothesised construct use behaviour (UB).

In accordance with the previous research of UTAUT, the following hypothesis is postulated [1,13]:

- H_1 : PE positively associated with students' ATU of Canvas.
- H_2 : PE positively associated with students' BI to use Canvas.
- H_3 : EE positively associated with students' ATU of Canvas.
- H_4 : EE positively associated with students' BI to use Canvas.
- H_5 : SI positively associated with students' ATU of Canvas.
- H_6 : SI positively associated with students' BI to use Canvas.
- H_7 : FC positively associated with students' ATU of Canvas.
- H_8 : FC positively associated with students' BI to use Canvas.
- H_9 : FC positively associated with students' UB of using Canvas.
- H_{10} : ATU positively associated with students' BI to use Canvas.
- H_{11} : BI positively associated with students' UB of using Canvas.

III. METHODOLOGY

A questionnaire containing 34 questions which comprised demographic questions and several multiple-item measures were formulated and arranged in a random order to eliminate order effect. Both English and Chinese versions of the questions were provided in the questionnaire. A seven-point Likert scale was used to measure all measurement items, ranging from 1 (strongly disagree) to 7 (strongly agree). Demographic data were collected on the respondents' gender, age, years of study, major, number of courses where Canvas was used.

A pilot study of the questionnaire was carried out before the actual sampling process. The sample frame of this study was limited to engineering undergraduate students where the use of Canvas in learning was mandatory. Questionnaires were randomly distributed to students with given instructions on completion of the questionnaires.

Reliability analysis was conducted to ensure consistency of the measurement items for each hypothesised construct. The internal consistency reliability of a construct was determined by the value of Cronbach's α . All hypothesised constructs showed a satisfactory level of reliability with the range from 0.79 to 0.90 [2,6]

IV. RESULTS

Total 100 valid surveys were collected from undergraduate engineering students with 83.3% response rate. The sample consisted of 39 males and 61 females. Dominant age groups

of the respondents were age 21 (40%), age 20 (22%), and age 22 (21%). Most of them were in their third year (32%) or fourth year of their studies (64%).

Pearson’s correlation coefficient was used to measure the association stated in the hypothesis H_1 to H_9 , while Spearman’s correlation coefficient was used for H_{10} and H_{11} owing to Use behaviour (UB) being ranked ordinal data [6].

TABLE I
 Hypothesis testing of correlations among constructs

Hypothesis	Correlation	r	p-value
H_1	Pearson’s correlation coefficient	0.559	<0.01
H_2	Pearson’s correlation coefficient	0.496	<0.01
H_3	Pearson’s correlation coefficient	0.310	<0.01
H_4	Pearson’s correlation coefficient	0.471	<0.01
H_5	Pearson’s correlation coefficient	0.552	<0.01
H_6	Pearson’s correlation coefficient	0.450	<0.01
H_7	Pearson’s correlation coefficient	0.246	<0.05
H_8	Pearson’s correlation coefficient	0.434	<0.01
H_9	Pearson’s correlation coefficient	0.102	0.311
H_{10}	Spearman’s correlation coefficient	0.300	<0.01
H_{11}	Spearman’s correlation coefficient	-0.007	0.942

Hypothesis testing Correlations coefficient among all hypothesised constructs are performed and its result is summarized in Table I. $H_1 - H_8$ and H_{10} are all accepted under level of significant 0.05 while H_9 and H_{11} not. Meanwhile, the result is presented with the dotted and solid lines which represent insignificant correlations represent positive correlations at least 0.05 significant level respectively (Refer to Figure 2).

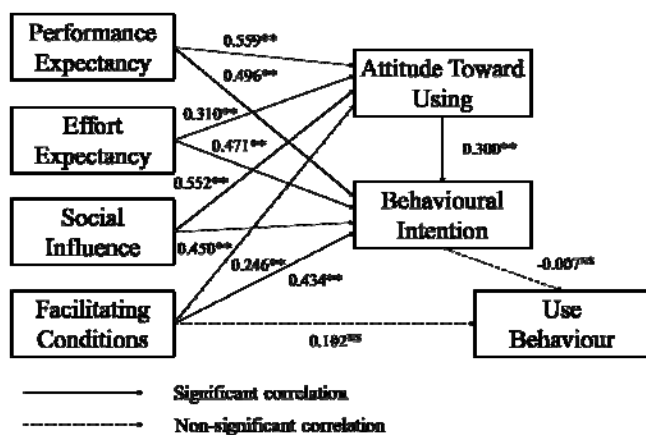


Figure 2. Resultant model: Hypotheses testing results

V. DISCUSSION

Aforementioned in previous section, H_1-8 and H_{10} are all supported. The results of the current study demonstrate that all four UTAUT determinants of behavioural intention have positive correlations with students’ attitudes toward using Canvas and their behavioural intention to use Canvas respectively. Evidence regarding the positive link between students’ attitude toward using Canvas and their intention to

use Canvas is also provided. With the addition of the TAM construct of attitude toward using into the original UTAUT model, the main findings of the current study demonstrate that modified UTAUT model proposed by Šumak et al. [12] is a valid model in explaining the development of acceptance of Canvas, and engineering students in one university in Hong Kong have generally accepted Canvas as their unified LMS in their studies.

On the contrary, H_9 and H_{11} are not supported. Correlation between facilitating conditions and students’ behaviour of using Canvas, and the correlation between their behavioural intention to use Canvas and their usage of Canvas are found to be not significant, which are not demonstrated in any previous research. Measurement error exists in quantifying students’ behaviour of using Canvas. Use behaviour is estimated by the frequency of Canvas use in a single week perceived by the respondents. It results in discrepancy between the perceived use frequency of Canvas and actual figures [6]. Furthermore, perceived frequency of Canvas is measured as ordinal. In line with survey statistics results, 62% used 1-10 times per week while 24% used 11-20 times per week. As a result, most of respondents fall under these two grouping and thus lead to low measurement sensitivity. Students’ perceived use frequency of Canvas cannot be effectively differentiated.

Implications of present study is to demonstrate the positive links between the UTAUT constructs. In spite of the mixed results in the attempt of Šumak et al. [12] to empirically test their modified UTAUT model, this study successfully validates the modified model in our effort to explore students’ acceptance of Canvas, and therefore implies its applicability to LMS environments in Hong Kong higher education.

Incorporating the attitude construct from TAM and hypothesising relationships between attitude and UTAUT constructs, the hypothesised model of the present study is a combination of TAM and UTAUT. Hypothesis testing result also implies that the attitude construct is vital in explaining e-learning acceptance.

VI. CONCLUSION

It can be concluded that Canvas is generally accepted by Engineering students. Empirical data demonstrates the positive and significant correlations among the model constructs, including, performance expectancy, effort expectancy, social influence, facilitating conditions, attitude toward using, and behavioural intention. Performance expectancy has the strongest positive links with attitude toward using and behavioural intention respectively. Out of expectation, both facilitating conditions and behavioural intention have no significant relationship with students’ actual use behaviour of Canvas.

This study could be taken a reference for the college to review the implementation. It is also encouraged to focus on the important aspects of social influence and performance expectancy to further enhance students’ acceptance of Canvas.

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