

Developing software piracy free organization: A case of an American business school in China

Jeonghwan Choi*, Rongxuan An, Jialu Zhao, Xiaohan Mao, Lingtian He

The habituation of legal software use for students on college campuses is important because it helps future professionals exercise the rules of ethical compliance. In this action research study, over a two-year period, we investigated the effects of planned change interventions (a.k.a. organizational development efforts) on legal software use at an American business school in China. We examined correlations among the unified theory of acceptance and use of technology constructs by using the partial least square structural equation modeling technique. After obtaining the evaluative surveys from undergraduate business students (n = 215), the results indicated that the adoption rate of legal software increased from 40% to 71%, and change interventions accelerated the speed of legal software use. While performance expectancy, effort expectancy, and social influence had significant influences on behavioral intention, we found a substantial gender difference in the effect of facilitating condition on the legal software use behavior. Females are less likely to accept legal software that is mandated by the organizational policy, but they are highly influenced by the social influence. We also found out that participants accept legal software differently according to their respective year in the organization. Relatively new students are sensitive to the organizational policy whereas experienced students give more attention to the benefits of using legal software. Based on these findings, we suggest gender sensitive organizational policy and structured institutional efforts to build a software piracy free organization.

Keywords: Software piracy, organizational development, action research, technology acceptance, change intervention, global campus, china, business education, PLS-SEM

"We are what we repeatedly do. Excellence, then, is not an act, but a habit." ~ Aristotle.

Introduction

Studies have shown that using pirated software in the workplace, or on the college campus is a central problem in both business and education (Peace et al., 2003, Publishers' Association, 1998). For instance, the use of pirated software results in higher prices to those who purchase legal software through authorized sales channels, which also deters the continual innovation of software producers (Chiang and Assane, 2002). In addition, malware attacks have dramatically increased (around 36% every year) and more than half a billion personal information records have been stolen or lost through data breaches in recent years because of using unlicensed software (BSA, 2016).

While a range of user behaviors have been studied, and related to national, cultural, and economic perspectives (Moore, 2005, Leidner and Kayworth, 2006, Wang et al., 2005), there have been few, if any studies, focusing on long-term user behavior changes regarding legal software acceptance within a global organization.

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The Global Campus

In May 2006, Kean University – a state university of New Jersey, USA, jointly established a global campus in Wenzhou, Zhejiang, China. Xi Jinping, the Secretary of Zhejiang Province (at that time) attended the signing ceremony, establishing the cooperation project, Wenzhou-Kean University (WKU). The global campus went into full operation in 2014 (WKU, 2018). As an accredited American higher education degree-granting institution, all courses at WKU are taught in English by Kean University professors recruited from English-speaking countries. Almost 800 out of 1,500 students are majoring in business disciplines such as Finance, Accounting, Marketing, and Global Business. More than 70 percent of WKU graduates go on to prestigious graduate programs including those in the US, UK, Australia, and Hong Kong (Kan and Morgan, 2018).

Following the code of conduct of its US campus, WKU is expected to comply with copyright rules and intellectual property protection policies in using educational software. As it is stated in the Kean Code of Conduct, all students are expected to use licensed software (please see the Kean Code of Conduct: <http://www.kean.edu/policies/code-of-conduct>). The US campus provides students full access to legal educational software such as Microsoft Office products. However, less than 40% of the business students at the china campus reported that they were using licensed Microsoft Office programs for business classes. In addition, less than 17% of those students knew that they could get licensed Microsoft Office product through the university (from a preliminary study, n = 30, Spring 2016). Using pirated software results in ineffective teaching and learning experiences in the classroom (Birch and Irvine, 2009). For example, an expatriated faculty member from the US campus identified students' using pirated software in his business analytics course teaching when many of the students reported that pirated Microsoft Excel programs did not work with the authorized add-in programs.

The disparity between the mother organization's policy and that of subsidiary organization's practice is not new in the field of management. Previous international studies about multinational organizations describe that there is a strong asymmetry between the headquarters (HQ) and its global subsidiaries (Björkman et al., 2007). More recent studies indicate that the disparity comes from a cultural gap between HQ and the hosting country; a choice of parent company strategy or policy (Gammelgaard et al., 2012); and the subsidiary's proactive actions (Dörrenbächer and Geppert, 2009, Rabbiosi, 2008, Mudambi et al., 2007).

On the other hand, user behavior studies in technology acceptance such as e-government systems, healthcare systems, learning technologies, online shopping tools, mobile devices, have flourished both in the US and outside of the US (Venkatesh et al., 2016, Williams et al., 2015).

No studies have been conducted on how the legal or licensed software use in a global campus can be promoted to align with the foreign HQ's policy, which is a critical aspect in determining international business education success. More should be known about the effects of change intervention and the influential factors of licensed software use behavior.

The Purpose of the Study

The purpose of this study is to address three research questions. First, do business students modify their user behavior over time when a change intervention applies? Second, if such user behavior change is found, what factors are influential in altering the user behavior? Finally, are those influential factors universal in terms of demographic differences such as gender and school year?

This study applied an action research method – aiming both at helping specific organizations implement planned change and at developing more general knowledge that can be applied to other settings (Cummings and Worley, 2008). In addition, the study investigated the relations of influential factors in technology acceptance and user behavior with underpinning the Unified Theory of Acceptance and Use of Technology (UTAUT) model (Venkatesh et al., 2003) by using the structural equation model (SEM) technique.

The knowledge from this study should help researchers and practitioners in business education have a better understanding of how to make a planned change (a.k.a. change management, organizational development) with respect to international education. In addition, the study addresses the demand for new knowledge on technology acceptance in a non-western culture. Finally, findings from this study can give managers and administrators practical implications for building developmental strategies and policies within an organization in the global environment.

Theory and Hypotheses

Diffusion of Legal Software Use

We define the *Diffusion of legal software use* as the process of legal software use that is communicated through certain channels over time among the members of a social system (Rogers, 2010). We define *Communication* as a process in which participants create and share information with one another to reach a mutual understanding within the social system. The diffusion of legal software use is characterized by four main elements: (1) legal software as an innovation, (2) communication channels, (3) time, and (4) a social system (Rogers, 2010).

First, we focus on the legal software adoption as an innovation diffusion process in this study. The innovation is an idea, practice, or object perceived as new by an individual or other unit of adoption (Rogers, 2010).

Second, the communication channel is the means that messages transfer from one individual to another. Interpersonal communication channels are more effective than mass media channels in forming and changing attitudes toward a new software because most people judge an innovation through the personal evaluation of their peers, who have adopted the new software (Rogers, 2010). This imitating behavior of others in a social system that can be understood as the “vicarious learning” – learning that is derived from indirect sources such as hearing or observation, rather than direct instruction (Bandura, 1991, Bandura, 1977).

Third, we shall see the changes in the adoption rate of legal software use at the global campus in China over time as several change actions are implemented. An individual has two choice options in the process of the diffusion of legal software: adoption and rejection over time. Among the three ‘theories of changing’ - Lewin’s Change Model, Action Research Model; Positive Model, we choose the Action Research Model to make a planned change (a.k.a. Organizational Development, OD) with an aim to not only to make a change but also to generate new knowledge that can be applied to other settings throughout interactive cycles of research and action (Cummings and Worley, 2008). Detailed change actions and interventions are presented in the next section.

Fourth, a global campus in mainland China was chosen as the social system for this study. A social system is a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal (Rogers, 2010). Relatively untapped by researchers, the international higher education business such as branch campuses or global campuses in Asia has expanded considerably since 2006 (Becker, 2015, Brustein, 2007). For example, more than 20 global campuses are operating in China, including four full scale branch campuses such as New York University Shanghai and Duke Kunshan University. Business education is the most popular academic discipline at those global campuses in China (Stanfield and Wang, 2015). In particular, Wenzhou-Kean University was selected as the social system selected to be studied because it is the only full-scale, accredited, US degree granting, undergraduate business education institution in China. We expect that the adoption rate of legal software use on this global campus will increase as the change actions apply throughout action research.

H1: Adoption rate of legal software use is increasing as change actions are applied at the global campus in China.

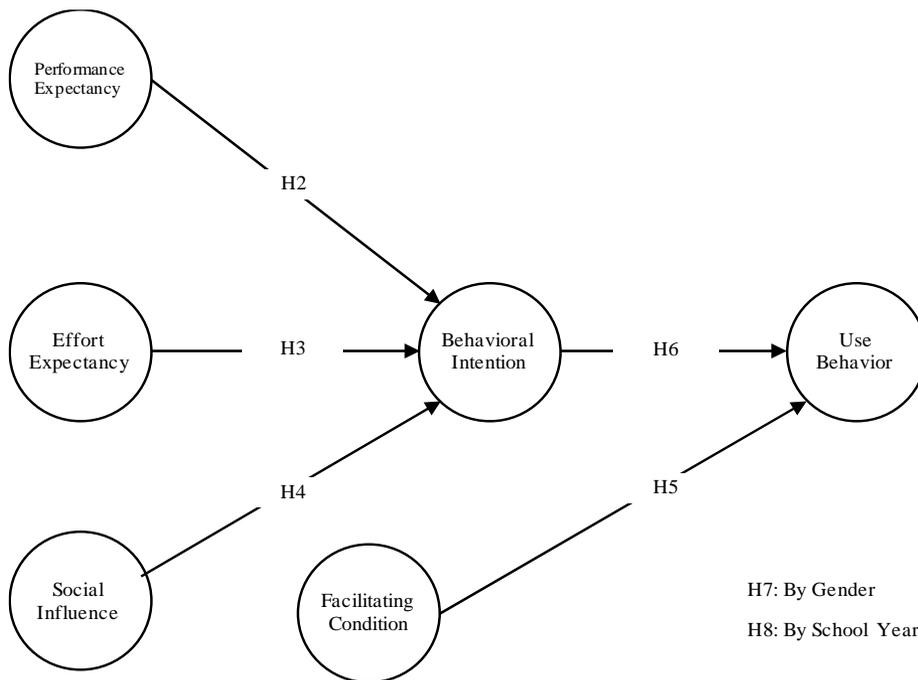
The UTAUT Model

The unified theory of acceptance and use of technology (UTAUT) is an integrative theory that explains and predicts individual acceptance and use of information technology (IT) in the workplace, campus, and a society (Venkatesh et al., 2003). Synthesizing the theory of reasoned action (TRA), the technology acceptance model (TAM), the theory of planned behavior (TPB), and the innovation diffusion theory (IDT), Venkatesh, Morris, Davis, and Davis (2003) identified three key factors (i.e. performance expectancy, effort expectancy, and social influence) that are related to predicting behavioral intention. They also identified that the constructed behavioral intention and the facilitating condition directly influence the use behavior primarily in the organizational context. The UTAUT has been widely used to explain individual technology acceptance and user decisions in organizations for various applications such as enterprise systems (e.g. ERP), collaboration technology (e.g. knowledge management systems), mobile shopping, healthcare systems, and e-government systems since its emergence (Venkatesh et al., 2016, Williams et al., 2015, Chan et al., 2010).

By focusing on educational settings, the UTAUT is more useful in the study of technology adoption in formal educational settings than informal ones (Straub, 2009). With this knowledge, researchers have studied the new technology acceptance – such as e-learning systems (Birch and Irvine, 2009, Yoo et al., 2012), tablet pc (Ifenthaler and Schweinbenz, 2013), mobile learning (Wang et al., 2009), blended learning (Khechine et al., 2014), and social network services (Escobar-Rodriguez et al., 2014) – in the formal classroom setting.

Influencing Factors on Legal Software Use Behavior

As noted, the UTAUT model suggests four major influencing factors in new technology use behavior. Performance expectancy, effort expectancy, and social influence can be understood to construct the behavioral intention, which, in turn, influences the use behavior. On the other hand, the facilitating condition also influences the use behavior directly (Venkatesh et al., 2003). Underpinning the original UTAUT model, we formulate a research model and hypotheses as shown in the Figure 1.

Figure 1 Research model and hypotheses

Performance expectancy and effort expectancy are the two strongest factors influencing behavioral intention. Performance expectancy is the degree to which an individual believes that using the system will help individuals attain objectives in job performance (Venkatesh et al., 2003). Synthesized by five relevant research constructs; perceived usefulness, extrinsic motivation, job-fit, relative advantage, and outcome expectations, the performance expectancy (PE) is expected to have a strong positive influence on behavioral intention (Venkatesh et al., 2003, Davis et al., 1989, Taylor and Todd, 1995).

H2: Performance expectancy (PE) has a positive influence on behavioral intention

Effort expectancy is the degree of ease associated with the use of the system (Venkatesh et al., 2003). Synthesized by three research constructs; perceived ease of use, complexity, and ease of use, the effort expectancy (EE) is expected to have a positive influence on behavioral intention (Agarwal and Prasad, 1997, Venkatesh et al., 2003).

H3: Effort expectancy (EE) has a positive influence on behavioral intention

Social influence is the degree to which an individual perceives that important others believe the individual should use the new system (Venkatesh et al., 2003). Synthesized by three research constructs – subjective norm, social factors, and image, the social influence (SI) is expected to have a positive influence on behavioral intention (Agarwal and Prasad, 1997, Ajzen, 1991, Venkatesh et al., 2003, Karahanna et al., 1999).

H4: Social influence (SI) has a positive influence on behavioral intention

The facilitating condition is the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system (Venkatesh et al., 2003). Synthesized by three research constructs – perceived behavioral control, facilitating conditions, and compatibility, the Facilitating condition (FC) is expected to have a direct and positive influence on legal software use behavior rather than having an indirect influence via behavioral intention (Ajzen, 1991, Taylor and Todd, 1995, Venkatesh et al., 2003, Thompson et al., 1991).

H5: Facilitating condition (FC) has a positive influence on legal software use behavior

Based on strong empirical studies about the positive relationship between intention and behavior (Ajzen, 1991, Sheppard et al., 1988), behavioral intention (BI) is expected to have a positive influence on legal software use behavior (Venkatesh and Davis, 2000, Venkatesh et al., 2003).

H6: Behavioral intention (BI) has a positive influence on legal software use behavior

Effects of Gender and School Year

We predict that the relationships among proposed constructs in the UTAUT are influenced by gender and school year at the global campus in China. As pointed out in previous studies, UTAUT constructs are moderated by gender, age, experience, and voluntariness of use (Venkatesh et al., 2016, Venkatesh et al., 2003, Wang et al., 2009). However, gender and age effects are not universally observed by studies (Williams et al., 2015, Khechine et al., 2014). Particularly two Asian UTAUT studies presented mixed results of gender and age effect (Chan et al., 2010, Wang et al., 2009).

For example, the gender effect of effort expectancy (EE) and facilitating condition (FC) were not found in a study (Chan et al., 2010) while the gender effect of social influence (SI) was observed in another study (Wang et al., 2009). Performance expectancy effect is universal regardless of gender difference in both studies. On the other hand, a separate study indicated that there was no age effect (Chan et al., 2010). Another study indicated that there were significant age effects in effort expectancy (EE) and social influence (SI) (Wang et al., 2009). Thus, it is necessary to empirically test gender and age effects in relation to legal software use. We use the school year as a proxy of age and experience because nearly all samples in this study are traditional students with almost the same age and level of user experience with Microsoft Office programs for school work.

Assuming these gender and age effects on UTAUT constructs (Chan et al., 2010, Venkatesh et al., 2003, Williams et al., 2015, Wang et al., 2009), we formulate the following hypotheses to test gender and school year influences on legal software use at the global campus in China.

H7: Relationships among UTAUT constructs are different by gender

H8: Relationships among UTAUT constructs are different by school year

Method

The purpose of this study is to address research questions: (1) does legal software use behavior change over time when change actions apply? (2) What are the factors, and what is their influence on changes in legal software use behavior? (3) Is the legal software use behavior different by gender and school year? The action research method and quantitative survey method are used to make a planned change (a.k.a. organizational development). The partial least square structural equation modeling (PLS-SEM) technique was applied to test eight proposed hypotheses.

Action Research for Planned Change

Kurt Lewin and his colleagues proposed the Action Research in 1940s. The Action Research method combines theory with practice through planned change and reflection processes (Adelman, 1993), and it has been widely used to make a planned change (a.k.a. organizational development) for an organization (Cummings and Worley, 2008). Four major action research streams have emerged with different emphases and traditions: (1) action research / survey feedback, (2) participatory action research, (3) action science, and (4) action learning (Lau, 1999). But the most unique nature of action research – interactive process of problem diagnosis, action intervention, and reflective learning by the researcher and participants does not change (McNiff, 2016, Cummings and Worley, 2008, Reason and Bradbury, 2007, Lau, 1999, Schön, 1995).

Synthesizing Lau's (1999) unified action research framework for information systems, the traditional action research / survey feedback technique (Cummings and Worley, 2008), and the basic nature of action research, we conducted a five staged action research as summarized as followings.

Pilot study: Problem identification
 Stage 1: Personal efforts
 Stage 2: Recruiting change agents
 Stage 3: Change interventions
 Stage 4: Evaluation
 Exit

Table 1 The Action Research Processes for Driving Legal Software Use on the Global Campus

Action Research Processes	Actions and Findings	Timeline
<i>Pilot study: Problem Identification</i>		
Problem identification	An expatriated business faculty from the mother campus identified the issue of illegal software use in his business analytics classes at the global campus	AY +01, Sept.
Consultation with behavioral science expert	The faculty consulted with the IT expert at mother campus and he discovered that all the college community members including students, faculty, and staffs could get legal Microsoft Office product for free at the Microsoft Office website.	AY +01, Oct.
Data gathering and preliminary diagnosis	The faculty conducted a preliminary online survey whether the illegal software use was a campus wide issue at the Chinese site (sample size n = 30). Less than 17% of business students knew that they could get the legal Microsoft Office Product from the mother campus. And less than 40% of business students at the global campus reported that they were using legal Microsoft Office programs for business classes.	AY +01, Oct. ~ Dec.
<i>Stage 1: Personal Efforts</i>		
Diagnosis of problem	The faculty member encouraged students using legal software early in the new semester. However, his personal efforts did not resonate campus wide change at the global campus.	AY +01, Feb. ~ Mar.
Action planning	The faculty decided to elaborate his personal change efforts as a campus wide initiative.	
Action	In parallel with the faculty's continual efforts of persuading students downloading and using the legal software, the faculty applied for an internal research project fund (2016 Quality First Initiative) with updated data after his personal efforts.	
Data gathering after action	A survey (sample size n = 76) results indicated that more than half (55.56%) of his students found out that they could get legal Microsoft Office products from the mother campus. But the usage rate of Microsoft Office 2016 / 365 remained low (13.16%).	AY +01, April ~ May
<i>Stage 2: Recruiting Change Agents</i>		
Diagnosis of problem	The faculty recognized the limitations of personal efforts in driving a campus wide change without institutional supports.	AY +02, Sept.
Action planning	The faculty applied for another research fund to support his campus wide change initiative (Student-Paring Faculty research fund).	AY +02, Sept.
Action	The faculty member got a research fund (20,000 RMB = 2971 USD), and he recruited four business students as change agents. These change agents actively engage in spreading out the legal software use within their peers. And the faculty and change agents conducted a large-scale survey (sample size n = 207) to check the effects of their change actions.	AY +02, Oct. ~ Nov.
Data gathering after action	The survey results indicated that the awareness of legal software accessibility had dramatically improved (from 55.56 % to 86.84%) throughout the word-of-mouth change intervention	AY +02, Dec.
<i>Stage 3: Change Interventions</i>		
Diagnosis of problem	Despite the students' awareness of accessibility to legal software download via the college had been improved, the proportion of legal software use behavior did not significantly improve (from 50% to 52.66%).	AY +02, Jan.
Action planning	Recognizing the limitation of word-of-mouth intervention, the action research team formulated multiple change interventions.	AY +02, Feb. ~ Mar.
Action	The action research team exercised multiple change interventions for a month (please refer to the Figure 2): <ul style="list-style-type: none"> • Poster • School Website / IT department • Faculty / Instructors / Administrators / Staffs • Personal networks (Social Network Service page e.g. WeChat) • Disseminating findings at a campus conference (Research day event, April 17) 	AY +02, April
Data gathering after action	A survey was conducted just after applying one-month long change interventions (sample size n = 71). Results indicated that the legal software use had increased to 60.56%. Especially, the proportion of Microsoft Office 2016 /365 usage had significantly increased from 36.23% to 43.66%.	AY +02, April
<i>Stage 4: Evaluation</i>		
Diagnosis of problem	The immediate survey that was conducted just after the change intervention would not tell the normalized change intervention effects because the adopting a new software took a time.	AY +02, May
Action planning	Continuing the change interventions, the team prepared the evaluation of the action research.	
Action	The action research team designed an integrative survey that included previous survey items and UTAUT model to examine effects of influential factors in adopting legal software use on the global campus	AY +02, June
Data gathering after action	The evaluative survey was administered on a large scale (sample size n=215) a month after the change interventions.	AY +02, June
<i>Exit</i>		

Note: AY = Academic Year.

Figure 2 Change intervention tools: Posters, websites, and social network service (WeChat)



Public Website & WeChat

https://mp.weixin.qq.com/s/Fs_qaRM-Yq1CAbqPPqTFZg

Sample and Procedure

A campus-wide quantitative survey was designed and administered to gather data from the business student population ($N \approx 800$) at the global campus. The survey instrument contained (1) introduction of the study, (2) consent form, (3) contacting information of the researchers and the Institutional Review Board office of the university, and (4) the survey instrument. The researchers chose a pen and pencil survey to avoid any human subject issues by not asking any identifiable personal information such as name, student ID, or email. In addition, a clear description that the survey was 100% voluntary and that participants could stop the survey anytime without any disadvantage was provided.

Four change agents, all business students, distributed 330 surveys to ensure sufficient sample size of 205. This target sample size came from Cohen's sample size recommendation of statistical power and effect sizes (Cohen, 1992). According to Cohen, the recommended sample size for a study of 5% significance level, 0.10 minimum R^2 , and maximum number of arrows pointing at a construct (in this study 5) was 205.

Two hundred and sixty-five surveys were completed and returned out of 330 distributed surveys. We screened out fifty non-business students' data or poor data input surveys, and 215 samples were chosen for further analyses.

The mined dataset was composed of 94 male business students (43.7%) and 121 female business students (56.3%). In demographics, 21 seniors (9.8%), 92 juniors (42.8%), 85 sophomores (39.5%), and 17 (7.9%) freshmen/fresh women business students completed and returned surveys. It is noteworthy that all participants are traditional students of nearly the same age and the level of school experiences due to the nature of the global campus and the Chinese higher education system (Kan and Morgan, 2018, WKU, 2018).

Measurements and Validation

Measurements. The dependent variable of (software) Use Behavior was measured by two survey items: (1) Do you think you are using a licensed (official, legal, registered) Office program? (2) Do you know that you can get licensed Microsoft Office products by using your school e-mail (xxx.edu) at the Microsoft Office Education Website (<https://products.office.com/en-us/student/office-in-education>)? Two control variables of gender and school year were asked to complete these questions for the participants.

Five key influencing factor constructs on the dependent variable are measured with items from the UTAUT (Venkatesh et al., 2003) by using a 6-point Likert scale form from 1 (strongly disagree) to 6 (strongly agree). The measurement instrument consisted of five constructs: performance expectancy (PE, 5 items), effort expectancy (EE, 7 items), social influence (SI, 2 items), facilitating condition (FC, 5 items), and behavioral intention (BI, 3 items). See Appendix for UTAUT survey items for this study.

The UTAUT measure have shown acceptable levels of reliability and validity in previous research (Venkatesh and Zhang, 2010, Venkatesh et al., 2016) regardless of cultural difference (Williams et al., 2015), especially in the Chinese contexts (Teo and Noyes, 2014, Chan et al., 2010, Venkatesh and Zhang, 2010).

We tested the reliability of these proposed key measures by using Cronbach's coefficient α estimates of internal consistency that is the most common scale reliability indicator in social science studies (Cronbach, 1951) by using the gathered 215 sample data. Results indicate that the measurement reliabilities are in satisfactory range of internal consistency, 0.79 ~ 0.84.

Measurement model validation. Assessing the validity of measurements is essential prior to conducting further statistical analyses (Schreiber et al., 2006). We use the confirmatory factor analysis (CFA) method because key constructs and variables of this study are driven by the theoretical relationship among the observed and unobserved variables (Schreiber et al., 2006). The factor loading criteria were set as greater than .50, considering the rule of thumb that less than .40 is weak and equal or greater than .60 is strong (Cabrera-Nguyen, 2010).

Three items had poor factor loadings: UP3 (.283); UE6R (-.099); Trial (.477). These poor factor-loading items were removed. Only the measurement model with satisfactory factor loaded items were confirmed for further analyses.

Structural model validation. Structural equation modeling (SEM) was used to examine the associations and the effects of key constructs of this study. We chose this quantitative data analysis technique because SEM technique gave us greater flexibility in model specification and estimation options (Preacher and Hayes, 2008). In addition, SEM allowed us to perform simultaneous testing of complex correlations and paths among multiple latent variables (Bollen, 2002, Jöreskog, 1978). However, we encountered the poor model fit problem when we use the covariance based structural equation model (CB-SEM) technique.

In the CB-SEM, several fit indices including chi-square (χ^2), degrees of freedom (df), probability (p), root mean square error of approximation ($RMSEA$), the comparative fit index (CFI), the Tucker-Lewis index (TLI), and standardized root mean squared residual ($SRMR$) are used to assess the structural model fit. For example, chi square over degrees of freedom (χ^2/df) was set as less than five; the probability was set as greater than five percent (5%); root mean square error of approximation ($RMSEA$) was set as less than .10; standardized root mean square residual ($SRMR$) was set as less than .08, and both the comparative fit index (CFI) and the Tucker-Lewis index (TLI) were set as larger than .95 based on the basing on the generally accepting model fit statistics rules (Hu and Bentler, 1999, Kline, 2010). We compared these cutoff criteria with our structural models to examine the model fitness. We used commercial statistical software of Stata 13 to conduct the CFA. The fit statistics from CB-SEM analysis indicate that the proposed structural model with our data does not surpass the established rules for further investigation.

Meanwhile, the partial least square structural equation modeling (PLS-SEM) method has emerged as a mainstream technique in technology acceptance and user behavior studies in the field of business and information system research (Williams et al., 2015). Specifically, recent studies showed that the PLS-SEM method is appropriate for UTAUT model studies (Khechine et al., 2014, Chan et al., 2010, Laumer et al., 2010).

Partial Least Square Structural Equation Modeling (PLS-SEM)

The PLS-SEM method gets special attention from business and social science researchers for its robustness in psychometric model analysis. This critical advantage makes the PLS-SEM an alternative technique for SEM, and it has become a key research method in recent years (Hair and Hult, 2016). For example, PLS-SEM gives a more robust structural equation model convergence over CB-SEM in many situations, especially when a research model has many indicators, paths, and relationships among key variables and constructs (Chin, 2010, Hair and Hult, 2016, Henseler et al., 2014). This benefit of PLS-SEM, has made it popular in management disciplines such as marketing management, strategic management, human resources management, and particularly management information systems (Hair and Hult, 2016, Williams et al., 2015, Hair et al., 2011).

Considering the rules of thumb for selecting CB-SEM or PLS-SEM (Hair et al., 2011), it was judged that the application of PLS-SEM technique was appropriate because this study's main goal was to explore new knowledge and to extend an existing structural theory for the complex UTAUT. Prior to conducting the PLS-SEM, we summarized the prerequisites or necessary conditions and recommendations through synthesizing a few foundational resources (Chin, 2010, Hair and Hult, 2016, Richter et al., 2016, Latan and Ramli, 2013). By using our data, we validated these seven categories of PLS-SEM guidelines:

- Data and sampling characteristics
- PLS-SEM algorithm
- Outer model evaluation: reflective (mode A)
- Out model evaluation: formative (mode B)
- Inner model evaluation: recursive model
- Model fit
- Multi-group analysis

Results of the validation of PLS-SEM are described in the Table 2.

Table 2 PLS-SEM guideline and compliance

Characteristics	Guideline	Recommendation	Compliance
<i>Data and sampling characteristics</i>			
Sample size	Ten times rule: the minimum sample size should be equal to the larger of 10x largest number of 1) formative indicator and structural paths directed at a particular latent construct (Wong, 2013) Alternatively, Cohen's sample size recommendation of statistical power and effect sizes takes into accounts. Cohen's sample size recommendation (In this study, 5% significance level, 0.10 minimum R ² , and maximum number of arrows pointing at a construct (5) = 205	<ul style="list-style-type: none"> • 10x formative indicator (N/A) • 10x structural paths directed a latent construct (10 x 5 = 50) • Cohen's sample size recommendation = 205 	Samples size n = 215 > 205
Holdout	30% of original sample (Hair and Hult, 2016)	> 30%	215/218 = 98.6%
Missing data	Less than 5% of missing or screening out data	< 5%	3 / 218 data were screened out = 1.38%
Distribution	Robust when applied to highly skewed data, but skewness and – kurtosis should be reported (Richter et al., 2016)		
<i>PLS-SEM Algorithm</i>			
Weighting scheme	In general, the path weighting scheme is strongly recommended because it provides the highest R ² value for endogenous latent variable (Vinzi et al., 2010)	path weighting	path weighting
Data metric	The standardized value setting	Mean 0, Var 1	Mean 0, Var 1
Total maximum iteration	The standard maximum iteration is 300	300	300
Abort criterion	The recommended number is 1.0E-5	1.0E-5	1.0E-7
Starting value	Initial outer weight can be set as 1.0	1.0	1.0
Algorithm to handle missing data	Missing value treatment options are mean replacement, EM (expectation-maximization algorithm), and nearest neighbor (Hair et al., 2013)	Mean replacement	Mean replacement
Bootstrap subsample size	The number of bootstrap samples should be high but must be at least equal to the number of valid observations. As a rule, 5,000 bootstrap samples is recommended (Hair and Hult, 2016)	2000 - 4000	5000
Bootstrap sign change	No sign change option is recommendable because it results in the most conservative outcome (Hair and Hult, 2016)	No sign change	No sign change
Significance level	Generally, 5% significance level is widely used in the social science field	5%, Two-tailed	5%, Two-tailed
Predictive relevance	In the process of blindfolding, omission distance (D) can be set between 5 and 10 (Hair and Hult, 2016)	5 ≤ D ≤ 10	D = 7
Software feature	SmartPLS (v. 3.2.6). Ringle, C. M., Wende, S., and Becker, J.-M. 2015. "SmartPLS 3." Boenningstedt: SmartPLS GmbH, http://www.smartpls.com .	-	-
<i>Outer model evaluation: Reflective (mode A)</i>			
Indicator reliability	Recommended > 0.6 for exploratory research and > 0.7 for confirmatory research (Chin, 2010)	> 0.7	All indicators (factor loadings) are higher than 0.7 [0.737 ~ 0.939]
Internal consistency reliability	The cut-off value for composite reliability is > 0.6 for exploratory research and > 0.7 for confirmatory research. The Cronbach's alpha is not suggested for distinguishing	> 0.7	All composite reliabilities are higher than 0.7 [0.904 ~ 0.952]
Convergent validity	The Average Variance Extracted (AVE) is > 0.5	AVE > 0.5	All AVE is higher than 0.5 [0.662 ~ 0.869]
Discriminant validity	Fornell and Larcker (1981) criterion: Each construct's AVE should be higher than its squared correlation with any other construct (Fornell and Larcker, 1981)	Square root AVE > Correlation	All square root AVE is larger than any other correlations with other constructs
	Cross-loading: Each indicator should load highest on the construct it is intended to measure (Chin, 2010)	Highest loading on the construct	Each indicator loaded highest on the intended construct
	Heterotrait-Monotrait Ratio (HTMT) should be under 0.85 for each outer model indicators: (Henseler et al., 2016)	HTMT ratio < 0.85	All HTMT ratios are under 0.85 [0.358 ~ 0.824] except 'Effort expectation and Facilitating' [0.852]

Item removal	If some items have been dropped to achieve a model fit, give additional information	-	No removed item
Outer model evaluation: Formative (Mode B)			
Collinearity	According to Confirmatory Tetrad Analysis (CTA), all constructs in the model are not formative constructs in 1% level of significance (Hair and Hult, 2016) The cut-off value for VIF should be smaller than 0.5. A stabilized estimation is suggested as ranging 2.5 ~ 3.3 (Hair et al., 2013)	N/A VIF < 0.5	N/A Most of outer VIF values are under 0.5 [1.000 ~ 4.014]. However, the VIF values of UP1 (6.070) and UP2 (6.425) are higher than the criterion. No removed construct
Construct removal	If a construct has been dropped due to collinearity, the problem should be reported.		
Inner model evaluation: Recursive model			
Path estimates	Reporting 1) Path coefficient 2) significance and confidence interval from bootstrapping	Bootstrapping is applied for the significant of the path coefficient with two-tails of 5% = 1.96	Bootstrapping is applied for the significant of the path coefficient with two-tails of 5% = 1.96
R ² (Adjusted R ²)	R ² acceptable level is context-dependent. (Hair and Hult, 2016, Latan and Ramli, 2013).	0.25: Weak 0.50: Moderate 0.75: Strong	R ² (Adj- R ²) of Behavioral intention: 0.584 (0.578) R ² of Use Behavior 0.180 (0.172)
Effect size f ²	Cohen's statistical power analysis of effect size (Cohen, 1992)	0.02: Weak 0.15: Moderate 0.35: Strong	PE: 0.169; EE: 0.053; SI: 0.044; BI: 0.040; FA: 0.016; BI: 0.040
Predictive relevance	The cross validated redundancy as a measure of Q ² is recommended because it includes the key element of the path model, the structural model, to predict eliminated data points (Hair and Hult, 2016, Chin, 2010).	Q ² > 0	Behavioral intention Q ² = 0.471 Use behavior Q ² = 0.151
Model fit*			
Standardized Root Mean Square Residual	SRMR	< .08	.059
Squared Euclidean Distance	d_ULS	< .95	.803
Geodesic Distance	d_G	< .95	.777
Multi-Group Analysis			
Bootstrapping for MGA	The number of bootstrap samples for Multi Group Analysis should be high but must be at least equal to the number of valid observations. As a rule, 5,000 bootstrap samples is recommended (Hair and Hult, 2016)	2,000 – 4,000	5,000
Path coefficient difference between groups	PLS-MGA (Henseler's MGA) with 5% of significance level.	t-value > 1.96 p-value < .05 or > .95	By gender, the path between Facilitating → Use behavior has a marginal difference (p = .055) By school year, the path between Effort expectancy → Behavioral intention has significant path coefficient difference

Note: *It is important to note that these model fit assessment criteria are often not useful for PLS-SEM and must be used with caution. These criteria are in their very early stage of research and not fully understood. However, these fit statistics give researchers to estimate the quality of the model when it is a reflective model (Hair and Hult, 2016). In more detail, please see this Note of Caution (<https://www.smartpls.com/documentation/functionalities/model-fit>)

Overall, our data and research model showed compliance with the proposed PLS-SEM guidelines. It should be noted that we use the Smart PLS [SmartPLS (v. 3.2.6). Ringle, Wende, and Becker, 2015. "SmartPLS 3." Boenningstedt: SmartPLS GmbH, <http://www.smartpls.com>] as the PLS-SEM analysis tool.

Results

Hypothesis Test Results of Diffusion of Legal Software Use

The first hypothesis of increasing the adoption rate of legal software use was supported as shown in the Figure 3 and Figure 4.

Figure 3 Changes of adoption rate of legal software use and licensed MS Office 2016 / 365

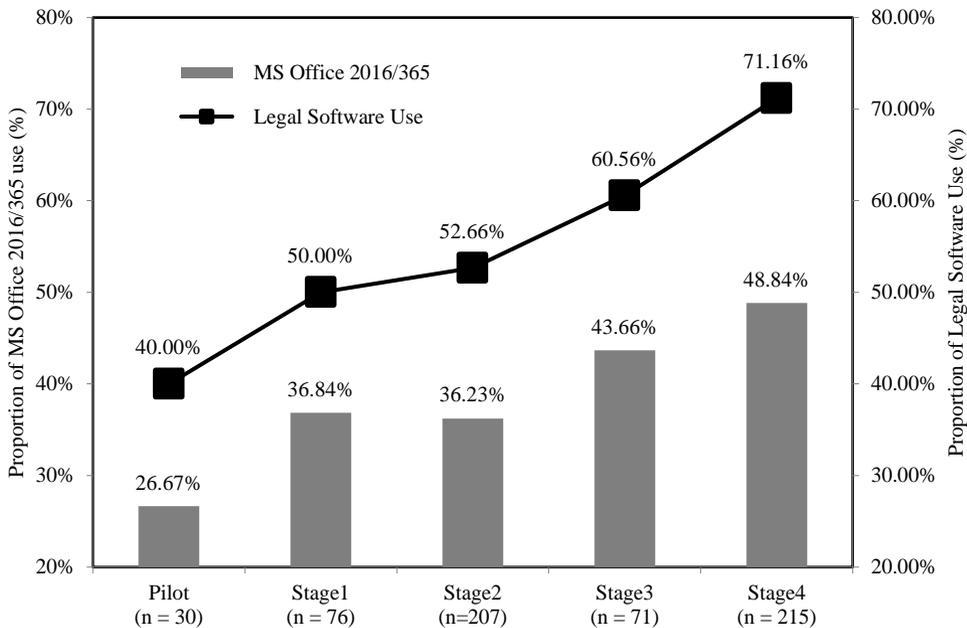
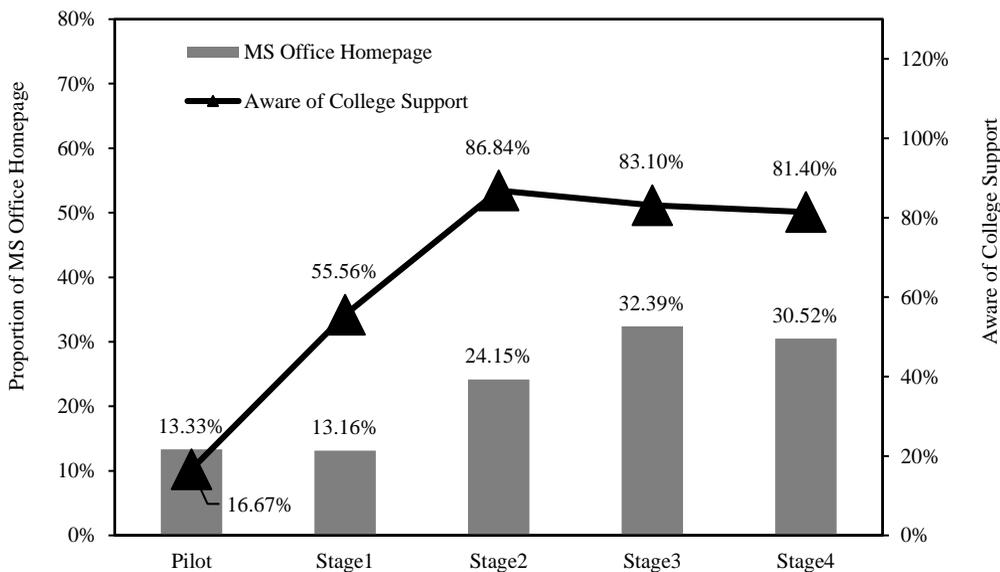


Figure 4 Changes of awareness of college support and legal software purchasing source



The adoption rate of legal software use increased from 40% to 71.16%. The adoption rate significantly increased in the Stage 3 and Stage 4 by 7.90% and 10.60%. These results indicated that the campus-wide planned change interventions encouraged students' adoption of legal software.

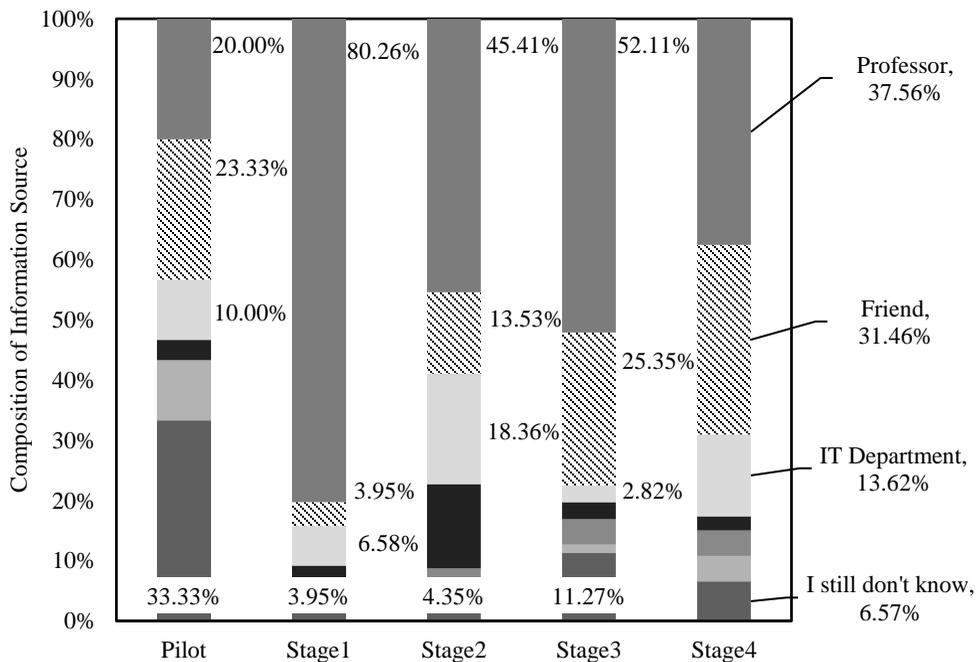
Second, the use of Microsoft Office 2016 / 365 increased from 26.67% to 48.84%. The global campus provided students with the most recent edition of Microsoft Office 2016 / 365 as the official school work tool. This result supported the significant increase of legal software use as the campus resource. In addition, the use of MS Office 2016 / 365 significantly increased by 7.43% in Stage 3, which was parallel with the significant increase in legal software usage at the same stage.

Third, the awareness of college support – students' learning that they could download Microsoft Office from the college for free – significantly increased in Stage 1 and Stage 2 from 16.67% to 86.84%. Meanwhile, the awareness of college support did not change much in Stage 3 and Stage 4.

Fourth, the proportion of students' using the Microsoft Office homepage as a purchasing channel increased from 13.33% to 32.39% by end of the campus wide change interventions. It is noteworthy that a significant perceptual change occurred ahead of the behavioral change. As shown in the Figure 3 and 4, the awareness of college support (perception) reached highest at Stage 2, while the behavior of using the college provided purchasing channel and legal software reached highest at Stage 3 and Stage 4.

We investigated the information sources for the legal software accessibility at the global campus. The results are shown in the Figure 5.

Figure 5 Proportional changes of legal software information source



Professors and instructors were the major sources of information in all stages. Friends were another information source. These two direct and face-to-face social networks were used as the dominant communication channels for the diffusion of legal software. As previously described, an innovation diffuses through the subjective evaluation of near peers who have adopted the new software (Rogers, 2010). The direct social networks might act as more important information channels than any other official information channels (e.g. Poster or Website) for the planned change at the campus throughout vicarious learning in the social systems (Bandura, 1991, Bandura, 1977).

Hypothesis Test Results of Influencing Factors on Legal Software Use Behavior

Prior to the testing hypotheses of these influencing factors, gender, and school year, we checked the reliability and construct validity by using PLS-SEM. The Outer PLS-SEM model analysis results are shown in the Table 3.

Table 3 Outer PLS-SEM Model Analysis Results

Measurement	Items	Factor loading	t-value	Internal consistency (Cronbach's alpha)	Composite reliability	Average Variance Extracted
	Criteria	.50 ~ .97	>1.96	> .70	> .60	> .50
Performance expectancy	UP1	.932	76.30	.930	.951	.872
	UP2	.938	82.18			
	UP4	.905	60.26			
	UP5	.864	31.98			
Effort expectancy	UE1	.864	36.60	.916	.935	.707
	UE2	.883	47.25			
	UE3	.853	31.13			
	UE4	.811	16.40			
	UE5	.846	31.82			
	UE7	.790	17.09			
Social influence	UI1	.902	46.50	.788	.904	.825
	UI2	.915	50.88			
Facilitating conditions	UF1	.737	13.40	.872	.907	.658
	UF2	.822	17.34			
	UF3	.791	15.68			
	UF4	.841	24.84			
	UF5	.871	37.18			
Behavioral intention	UB1	.920	56.26	.923	.950	.867
	UB2	.937	73.27			
	UB3	.939	66.74			
Use behavior	Use	1	-	-	-	-

Note: SmartPLS software (Ver. 3.2.6). Abort criterion is 1.0E-7. Average Variance Extracted (AVE) indicates the convergent validity of a construct. The problematic items (UP3, UE6R, Trial) that had less than the proposed factor loading criteria (> .50) were removed from the further analysis. The 'Use behavior' becomes a single item construct after removing the 'Trial' item. The outer model is thought as 'reflective model (mode A)' (Latan and Ramli, 2013).

Reliabilities of all measurement constructs and items were satisfactory, the internal consistency (Cronbach α) ranged from .788 to .930, and composite reliabilities ranged from .904 to .951. The convergent validity of each construct was satisfactory and ranged from .658 to .872 according to the average variance extracted (AVE) indicators. In addition, all measurement item factor loadings were higher than 0.70, and ranged from 0.737 to 0.939.

The inner PLS-SEM model analysis results. The inner PLS-SEM model results, which are like the structural model in CB-SEM analysis results, are summarized as followings.

Figure 6 Partial least square structural equation modeling (PLS-SEM) testing results of UTAUT model

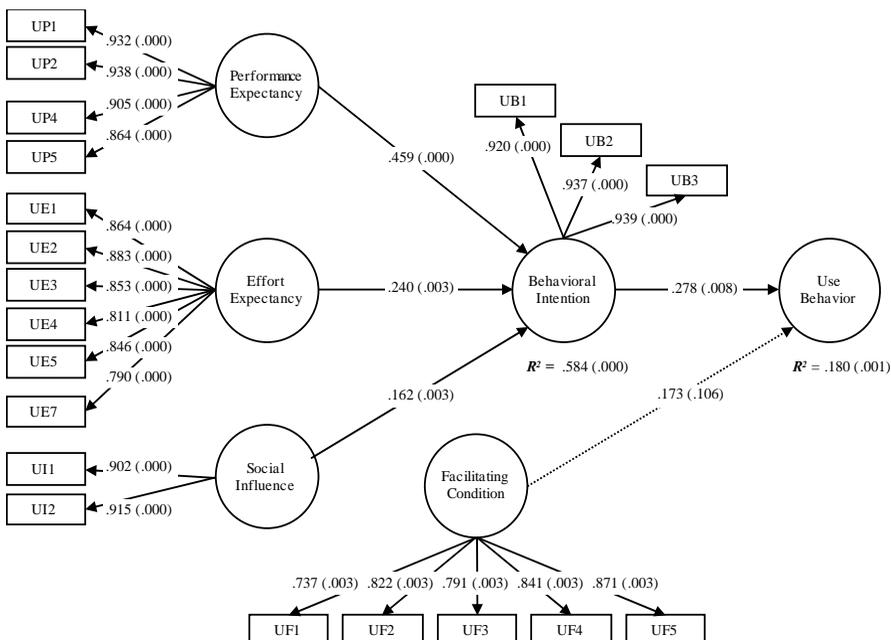


Table 4 Inner PLS-SEM Model Analysis Results

Path	Coefficient	t-value	p-value	CI (2.5%)	CI (97.5%)
Performance expectancy → Behavioral intention	.459	5.113	.000	0.272	0.625
Effort expectancy → Behavioral intention	.240	2.933	.003	0.083	0.403
Social influence → Behavioral intention	.162	2.969	.003	0.055	0.268
Facilitating condition → Use behavior	.173	1.617	.106	- 0.020	0.396
Behavioral intention → Use behavior	.278	2.648	.008	0.057	0.469

First, performance expectancy (PE), effort expectancy (EE), and social influence were hypothesized to have a positive influence on behavioral intention (BI). These hypotheses were supported by the evaluative survey data. The performance expectancy had a significant positive relationship with behavioral intention, H2: $\beta = .459$; $t = 5.113$; $p = .000$. The effort expectancy had a significant positive relationship with behavioral intention, H3: $\beta = .240$; $t = 2.933$; $p = .003$. The social influence (SI) had a significant positive relationship with behavioral intention, H4: $\beta = .162$; $t = 2.969$; $p = .003$.

Second, the facilitating conditions (FC) were hypothesized to have a positive influence on use behavior (UB). However, the result did not support the hypothesis in the 5% significant level, H5: $\beta = .173$; $t = 1.617$; $p = .106$.

Third, the behavioral intention (BI) was hypothesized to have a positive influence on use behavior (UB). The result supports the hypothesis in the 1% significant level, H6: $\beta = .278$; $t = 2.648$; $p = .008$.

In short, hypotheses 2, 3, 4, and 6 were supported according the PLS-SEM model analyses. But the model analysis data did not fully support the hypothesis 5.

Indirect effect analysis results. Adding to the direct effect analysis, we also conducted the indirect effect analysis. The indirect effect analysis results are shown in the Table 5.

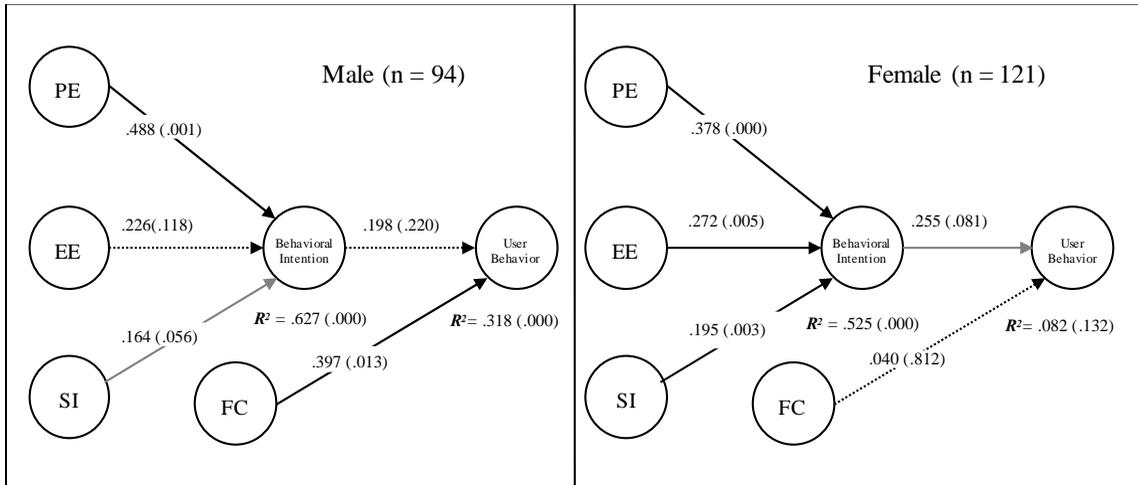
Table 5 Indirect Effect Analysis Results

Indirect Path	Coefficient	t-value	p-value	CI (2.5%)	CI (97.5%)
Performance expectancy → Use behavior	.128	2.229	.026	0.021	0.243
Effort expectancy → Use behavior	.067	2.156	.031	0.012	0.131
Social influence → Use behavior	.045	1.804	.071	0.005	0.101

The indirect effect of performance expectancy (PE) and effort expectancy (EE) on use behavior (UB) were significant in 5% level, PE→UB via BI: Coefficient = .128; $t = 2.229$; $p = .026$, EE→UB via BI: Coefficient = .067; $t = 2.156$; $p = .031$. However, the indirect effect of social influence (SI) on use behavior (UB) were marginal, SI→UB via BI: Coefficient = .045; $t = 1.804$; $p = .071$. These results can be interpreted as those personal perceptions of performance expectancy (PE) and effort expectancy (EE), made statistically significant influences on user behavior while the social influence (SI) had marginal indirect influence.

Hypothesis Test Results of Gender and School Year Effects

Effect of gender. We hypothesized that relationships among the UTAUT constructs might differ by gender. This hypothesis was supported by the PLS-SEM and multi-group analysis as followings.

Figure 7 Partial least square structural equation modeling (PLS-SEM) testing results of UTAUT model by gender**Table 6** Inner PLS-SEM Model Analysis Results by Gender

Path	Gender	Coefficient	t-value	p-value	CI (2.5%)	CI (97.5%)
Performance expectancy → Behavioral intention	Male	.488	3.316	.001	0.206	0.789
	Female	.378	3.554	.000	0.174	0.584
Effort expectancy → Behavioral intention	Male	.226	1.565	.118	- 0.104	0.471
	Female	.272	2.831	.005	0.093	0.463
Social influence → Behavioral intention	Male	.164	1.908	.056	- 0.005	0.332
	Female	.195	2.956	.003	0.066	0.325
Facilitating condition → Use behavior	Male	.397	2.490	.013	0.060	0.683
	Female	.040	0.238	.812	- 0.441	0.259
Behavioral intention → Use behavior	Male	.198	1.225	.220	- 0.096	0.544
	Female	.255	1.746	.081	0.032	0.619

Note: All outer PLS model factor loadings of Male are higher than 0.7: Male: .767 ~ .944. But a few number of Facilitating condition outer PLS model factor loadings of Female are less than 0.7: Female: UF1= .538, UF2= .645; UF3 = .668.

The influence of performance expectancy (PI) on behavioral intention (BI) was universally significant regardless of gender. This result confirms that the performance expectancy was the most influential factor in adopting a new technology regardless of demographic or cultural variations (Venkatesh et al., 2003, Venkatesh and Zhang, 2010, Wang et al., 2009).

Second, the influence of effort expectancy (EE) on behavioral intention (BI) was different by gender. For female students, the influence of effort expectancy on behavioral intention was statistically significant at the 1% level, $\beta = .272$; $t = 2.831$; $p = .005$ while the influence of effort expectancy was not significantly observed for male students, $\beta = .226$; $t = 1.565$; $p = .118$.

Third, and contrasting to a previous study (Wang et al., 2009), the relationship between social influence (SI) and behavioral intention (BI) was found significant at the 5% level for females, $\beta = .195$; $t = 2.956$; $p = .003$. But, for males, the relationship was weak and statistically marginal, $\beta = .164$; $t = 1.908$; $p = .056$.

Fourth, the influence of the facilitating condition (FC) on the legal software use behavior (UB) deferred by gender. For male student, the influence of facilitating condition on behavioral intention was solid, $\beta = .397$; $t = 2.490$; $p = .013$. But, the influence of facilitation condition (FC) on behavioral intention was not observed, $\beta = .040$; $t = 0.238$; $p = .812$.

Fifth, the influences of behavioral intention (BI) on use behavior by gender were marginally different. For female students, the influence of behavioral intention was statistically significant at the level of 10%, $\beta = .255$; $t = 1.746$; $p = .081$. But, for male students, the influence of behavioral intention on use behavior was not statistically significant, $\beta = .198$; $t = 1.225$; $p = .220$.

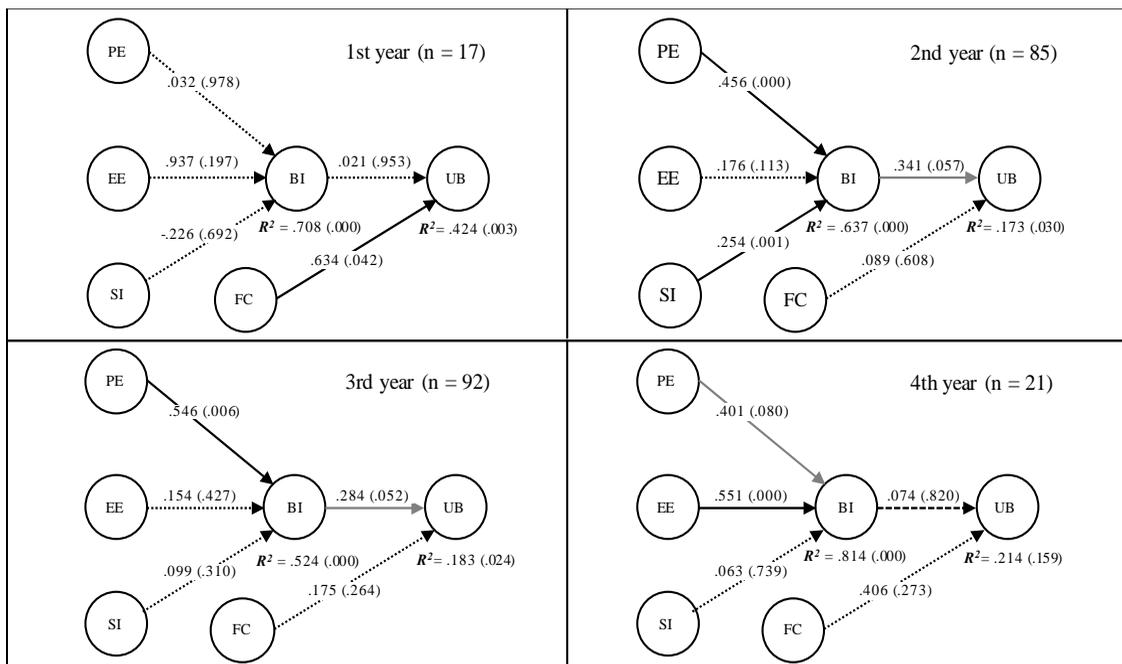
We conducted the PLS multi-group analysis (PLS MGA) to confirm the gender difference in relationships among UTAUT constructs. PLS-MGA results are shown in the following table.

Table 7 PLS Multi-Group Analysis (PLS MGA) Results by Gender

Comparison (PLS-Multi Group Analysis) By Gender (Male vs. Female)	Δ Path Coefficient ($\beta_{\text{Male}} - \beta_{\text{Female}}$)	P-Value
Performance Expectancy → Behavioral Intention	0.110	.274
Effort Expectancy → Behavioral Intention	0.046	.591
Social Influence → Behavioral Intention	0.031	.613
Facilitating Condition → Use Behavior	0.357	.056
Behavioral Intention → Use Behavior	0.057	.605

The differences of path coefficient by gender (Δ Path Coefficient = $\beta_{\text{Male}} - \beta_{\text{Female}}$) ranged from 0.057 to 0.357. Among the UTAUT constructs, the influence of facilitating condition (FC) on use behavior (UB) showed a significant gender difference, Δ Path Coefficient = .357; $p = .056$. But the gender difference was not statistically supported among the other UTAUT constructs relations.

Effect of school year. We used the school year as a proxy of age and experience because all the participants were traditional students at the global campus. The school year effect was analyzed by using the PLS SEM, and results are presented in Figure 8, Table 11.

Figure 8 Partial least square structural equation modeling (PLS-SEM) testing results of UTAUT model by school year**Table 8** Inner PLS-SEM Model Analysis Results by School Year

Path	School year	Coefficient	t-value	p-value	CI (2.5%)	CI (97.5%)
Performance expectancy → Behavioral intention	1 st	.021	0.028	.978	-0.939	0.622
	2 nd	.456	3.496	.000	0.200	0.720
	3 rd	.546	2.725	.006	0.138	0.898
	4 th	.401	1.750	.080	-0.093	0.813
Effort expectancy → Behavioral intention	1 st	.937	1.291	.197	0.418	2.236
	2 nd	.176	1.594	.113	-0.030	0.408
	3 rd	.154	0.795	.427	-0.203	0.547
	4 th	.551	3.676	.000	0.262	0.801
Social influence → Behavioral intention	1 st	-.226	0.396	.692	-1.820	0.041
	2 nd	.254	3.357	.001	0.108	0.408
	3 rd	.099	1.015	.310	-0.104	0.281

	4 th	.063	0.334	.739	-0.372	0.390
Behavioral intention → Use behavior	1 st	.021	0.059	.953	-0.542	0.787
	2 nd	.341	1.903	.057	0.027	0.723
	3 rd	.284	1.940	.052	0.016	0.604
	4 th	.074	0.227	.820	-0.381	1.126
Facilitating condition → Use behavior	1 st	.634	2.209	.042	-0.878	1.046
	2 nd	.089	0.513	.608	-0.372	0.369
	3 rd	.175	1.117	.264	-0.171	0.460
	4 th	.406	1.095	.273	-0.944	0.763

Note: All outer PLS model factor loadings are higher than 0.7 excepts three measurements: 1st Year UB1 = .625; 4th Year: UF1 = .059, UF2=.344, UF3=.237.

For the first-year students, the influence of facilitation condition (FC) on user behavior (UB) was statistically significant at 5% level, $\beta = .634$; $t = 2.209$; $p = .042$ while the other influences were not statistically significant.

For the second-year students, the influence of performance expectancy and social influence on behavioral intention were quite solid, $PE \rightarrow BI$: $\beta = .456$; $t = 3.496$; $p = .000$; $SI \rightarrow BI$: $\beta = .254$; $t = 3.357$; $p = .001$. However, the influence of effort expectancy on behavioral intention was not significant at the level of 5%, $\beta = .176$; $t = 1.594$; $p = .113$. The influence of facilitating condition on user behavior was not statistically supported as well, $\beta = .089$; $t = 0.513$; $p = .608$. The influence of behavioral intention on user behavior was marginal, $\beta = .341$; $t = 1.903$; $p = .057$.

For the third-year students, the influence of performance expectancy on behavioral intention was statistically significant, $\beta = .546$; $t = 2.725$; $p = .006$, while the effort expectancy and social influence were not significant. The facilitating condition did not show the statistically meaningful correlation with user behavior, $\beta = .175$; $t = 1.117$; $p = .264$. The influence of behavioral intention on user behavior was statistically marginal, $\beta = .284$; $t = 1.940$; $p = .052$.

For the fourth-year students, only two personal factors – performance expectancy and effort expectancy showed statistically meaningful correlation with behavioral intention, $PE \rightarrow BI$: $\beta = .401$; $t = 1.750$; $p = .080$; $EE \rightarrow BI$: $\beta = .551$; $t = 3.676$; $p = .000$ while those social factors – social influence and facilitating conditions did not show statistically meaningful correlations.

To confirm school year effects, we conducted the PLS multi-group analysis (PLS-MGA) and the analysis results are shown in the following table.

Table 9 PLS Multi-Group Analysis (PLS MGA) Results by School Year

Comparison (PLS-Multi Group Analysis) By School Year	Δ Path Coefficient	P-Value
Performance Expectancy → Behavioral Intention	-	-
Effort Expectancy → Behavioral Intention [1 st – 3 rd]	0.783	.040
Effort Expectancy → Behavioral Intention [3 rd – 4 th]	.374	.978
Social Influence → Behavioral Intention	-	-
Facilitating Condition → Use Behavior	-	-
Behavioral Intention → Use Behavior	-	-

Note: PLS-MGA (Henseler's MGA) with 5% of significance level. p-value < .05 or > .95

According to the PLS-MGA by school years, two significantly different path coefficient differences were observed in the relationship between effort expectancy (EE) and behavior intention (BI), $EE \rightarrow BI$: Δ Path Coefficient (1st – 3rd) = .783; $p = .040$; $EE \rightarrow BI$: Δ Path Coefficient (3rd – 4th) = .374; $p = .978$.

Taking all things together, we found out that the proposed eight hypotheses of this study were supported. However, hypothesis 5 (facilitating condition has a positive influence on use behavior) was not supported for females. We discuss these findings in the next section.

Discussion

Habituating a positive behavior is a main goal of learning and education (Covey, 1989, Merriam et al., 2007). Business students' using the legal software during college years is important because it helps future business professionals exercise compliance in the respective business disciplines. In addition, using legal software in classes increases learning effectiveness while marginalizing the risks of malware attacks and personal information leaks (BSA, 2016). In the streamlining the establishment of global campuses outside of the US (Brustein, 2007), we investigated the effects of action research for diffusing legal software use at a global campus in China, and, at the same time, underpinning the unified theory of acceptance and use of technology (UTAUT) model. Synthesizing the results and findings from the

proposed eight hypotheses testing, we discuss the implications, limitations, and future directions for further research in the following sections.

Theoretical Implication

Adding to the established knowledge about diffusion of innovation (Rogers, 2010), the speed of adopting a new legal software can change in accordance with the implementation of change interventions. For example, our study showed that the adoption rate of legal software use was geared up when the institution's wide change interventions were applied - the proportion of using legal software use has significantly increased in the Stage 3 and Stage 4 by 7.90% and 10.60%. Our longitudinal study confirms that diffusion of legal software use can occur in the global campus context when we carefully apply well-planned change interventions.

Second, we found out that a cognition change that is mainly socially constructed by peer influences occurs prior to a user behavior change. We observed that the awareness of college support (perception) reached highest at Stage 2 (86.84%) and sustained, while, the adoption rate of legal software use peaked at the final Stage 4. As described in the social cognitive theory (Bandura, 1991, Bandura, 1977), direct peers like professors and friends (69.02%) acted as the main influencing information source in changing user cognition. And this socially constructed cognition drove the students' adoption and use of legal software. So, we may conclude that delivering a new idea through a more direct personal network would be more effective in changing user cognition, and, in turn change user behavior.

Third, this empirical study showed holistic gender and school year (a proxy of age and experience) effects on technology acceptance and use behavior in the Chinese context. Previous UTAUT research reported mixed results of gender or age effects (Khechine et al., 2014, Venkatesh et al., 2003, Venkatesh and Zhang, 2010, Wang et al., 2009) by using traditional moderation effect analysis or covariance-based structural equation modeling (CB-SEM) techniques. However, this study applied the partial least square structural equation model (PLS-SEM) and multi-group analysis (PLS-MGA) methods for a holistic analysis of gender and school year effects. Our findings may give us a more rigorous understanding.

For example, we found a contrasting result in a previous study (Wang et al., 2009). Our results support the mainstream research findings about gender effect on technology acceptance, that is females are more socially motivated users while males are more pragmatic (Koivisto and Hamari, 2014, Haferkamp et al., 2012, Muscanell and Guadagno, 2012).

Regarding the school year effect, we found institutional intervention (e.g. facilitating condition) was more influential on legal software use behavior for freshmen/fresh women than seasoned students. This finding supports the argument that age and experience are influential on technology acceptance in multiple cultural contexts (Venkatesh et al., 2003, Venkatesh et al., 2016, Wang et al., 2009, Williams et al., 2015)

Practical Implications

This study can give a few practical implications for organizational leaders, global managers, policy makers, change agents, and high education administrators.

First, this study sheds light on the possibility of developing the software piracy free organization when the industrial leadership (particularly ICT industry) provides well-structured institutional change interventions for global organizations that are residing in the software piracy friendly countries like China (Dunn and Shome, 2009).

Second, organizational leaders may invest in giving more formal and institutional interventions in an early stage of newly hired or relative new employees to build the software piracy free organization. As we have found out, the facilitating conditions such as providing 'information sessions' to deliver knowledge about accessible organizational resources had the most significant influence on legal software use behavior for new comers of an organization.

Third, managers and school administrators may give seasoned employees and students informal reminders through social networks such as supervisors and professors to continually motivate students to use legal software for their work. Seasoned employees and students change their legal software use behavior when they get the message from their direct authority figures. So, managers and administrators may need to send out continual reminders through campus emails, containing the benefits of legal software use.

Fourth, policy makers may differentiate delivering methods of legal software use policy by gender. As we have found that females are more sensitive to messages from direct social networks like supervisors, professors and friends, policy makers may need to develop and deliver a 'gender sensitive' change intervention such as 'technology workshop for women' in the organization. On the other hand, the school may deliver instructional messages for males using campus resources such as an IT department.

Limitations and Future Research

There is no research without limitation, and this study is not an exception. First, the common-method bias was not fully ruled out because we used the self-reporting survey method to collect key variables. Self-report bias occurs when the same respondent provides the measure of the predictor and criterion variable (Podsakoff and MacKenzie, 1994, Podsakoff et al., 2003). For example, we collected influencing variables and use behavior data from the same survey participants, and this self-reporting survey feedback contained a certain level of social desirability – the tendency on the

part of individuals to present themselves in a favorable light regardless of their true feelings about a survey question (Johnson and Van de Vijver, 2003, Podsakoff et al., 2003).

Especially, the social desirability bias is expected to be higher in Asian contexts (Dunn and Shome, 2009, Heine and Lehman, 1995). We collected data by using pen and pencil surveys without asking for any identifiable personal information such as name, student ID, or email to acquire straightforward answers from participants under 100% voluntary condition. However, data gathering from a second source may be more desirable to exclude potential same source bias.

Second, we would like to recommend using the panel study method – collecting repeated measures from the same sample at different point in time – for future research to examine changes of a target population (Swanson and Holton, 2005). In this study, we randomly chose samples by stage. And, our random samples might have a limited representation of the changes of perception and behavior over time.

Third, triangulating data sources – a method for seeking convergence across quantitative and qualitative data – can serve researchers cultivating a better understanding about the diffusion of legal software from future research. We used a conventional action research method – action and survey feedback – to drive a change and explore new knowledge (McNiff, 2016, Cummings and Worley, 2008, Reason and Bradbury, 2007, Lau, 1999, Schön, 1995). However, applying the mixed method based action research of UTAU model would give us a thorough understanding from future research (Huang and Martin-Taylor, 2013).

In summary, this study can be a strong stepping-stone for future studies that help ICT industry leaders, global managers, and educational administrator change and develop future business leaders, who follow strict ethical and social regulations by habituating legal software use in the global context.

References

- ADELMAN, C. 1993. Kurt Lewin and the origins of action research. *Educational action research*, 1, 7-24.
- AGARWAL, R. & PRASAD, J. 1997. The role of innovation characteristics and perceived voluntariness in the acceptance of information technologies. *Decision sciences*, 28, 557-582.
- AJZEN, I. 1991. The theory of planned behavior. *Organizational behavior and human decision processes*, 50, 179-211.
- BANDURA, A. 1977. Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191-215.
- BANDURA, A. 1991. Social cognitive theory of self-regulation* 1. *Organizational Behavior and Human Decision Processes*, 50, 248-287.
- BECKER, R. 2015. International branch campuses: New trends and directions. *International Higher Education*.
- BIRCH, A. & IRVINE, V. 2009. Preservice Teachers' Acceptance of ICT Integration in the Classroom: Applying the UTAUT Model. *Educational Media International*, 46.
- BJÖRKMAN, I., FEY, C. F. & PARK, H. J. 2007. Institutional theory and MNC subsidiary HRM practices: evidence from a three-country study. *Journal of International Business Studies*, 38, 430-446.
- BOLLEN, K. A. 2002. Latent variables in psychology and the social sciences. *Annual Review of Psychology*, 53, 605-634.
- BRUSTEIN, W. I. 2007. The global campus: Challenges and opportunities for higher education in North America. *Journal of Studies in International Education*, 11, 382-391.
- BSA 2016. Seizing Opportunity Through License Compliance: BSA Global Software Survey. Business Software Alliance.
- CABRERA-NGUYEN, P. 2010. Author guidelines for reporting scale development and validation results in the Journal of the Society for Social Work and Research. *Journal of the Society for Social Work and Research*, 1, 99-103.
- CHAN, F. K., THONG, J. Y., VENKATESH, V., BROWN, S. A., HU, P. J. & TAM, K. Y. 2010. Modeling Citizen Satisfaction with Mandatory Adoption of an E-Government Technology. *Journal of the Association for Information Systems*, 11, 519-549.
- CHIANG, E. & ASSANE, D. 2002. Copyright piracy on the university campus: Trends and lessons from the software and music industries. *International Journal on Media Management*, 4, 145-149.
- CHIN, W. W. 2010. How to write up and report PLS analyses. *Handbook of partial least squares*, 655-690.
- COHEN, J. 1992. A power primer. *Psychological bulletin*, 112, 155.
- COVEY, S. R. 1989. *The Seven Habits of Highly Effective People*, Free Press.
- CRONBACH, L. J. 1951. Coefficient alpha and the internal structure of tests. *Psychometrika*, 16, 297-334.
- CUMMINGS, T. G. & WORLEY, C. G. 2008. *Organization Development and Change*, Mason, OH 45040 USA, Thomson South-Western.
- DAVIS, F. D., BAGOZZI, R. P. & WARSHAW, P. R. 1989. User Acceptance of Computer Technology: a Comparison of Two Theoretical Models. *Management Science*, 35, 982-1003.
- DÖRRENBÄCHER, C. & GEPPERT, M. 2009. A micro-political perspective on subsidiary initiative-taking: Evidence from German-owned subsidiaries in France. *European Management Journal*, 27, 100-112.
- DUNN, P. & SHOME, A. 2009. Cultural Crossvergence and Social Desirability Bias: Ethical Evaluations by Chinese and Canadian Business Students. *Journal of Business Ethics*, 85, 527-543.
- ESCOBAR-RODRIGUEZ, T., CARVAJAL-TRUJILLO, E. & MONGE-LOZANO, P. 2014. Factors that influence the perceived advantages and relevance of Facebook as a learning tool: An extension of the UTAUT. *Australasian Journal of Educational Technology*, 30.
- FORNELL, C. & LARCKER, D. F. 1981. Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, 39-50.
- GAMMELGAARD, J., MCDONALD, F., STEPHAN, A., TÜSELMANN, H. & DÖRRENBÄCHER, C. 2012. The impact of increases in subsidiary autonomy and network relationships on performance. *International Business Review*.
- HAFERKAMP, N., EIMLER, S. C., PAPADAKIS, A.-M. & KRUCK, J. V. 2012. Men are from Mars, women are from Venus? Examining gender differences in self-presentation on social networking sites. *Cyberpsychology, Behavior, and Social Networking*, 15, 91-98.
- HAIR, J. F. & HULT, G. T. M. 2016. *A primer on partial least squares structural equation modeling (PLS-SEM)*, Sage Publications.
- HAIR, J. F., RINGLE, C. M. & SARSTEDT, M. 2011. PLS-SEM: Indeed a silver bullet. *Journal of Marketing theory and Practice*, 19, 139-152.
- HAIR, J. F., RINGLE, C. M. & SARSTEDT, M. 2013. Partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. *Long Range Planning*, 46, 1-12.

- HEINE, S. J. & LEHMAN, D. R. 1995. Social desirability among Canadian and Japanese students. *The Journal of Social Psychology*.
- HENSELER, J., DIJKSTRA, T. K., SARSTEDT, M., RINGLE, C. M., DIAMANTOPOULOS, A., STRAUB, D. W., KETCHEN JR, D. J., HAIR, J. F., HULT, G. T. M. & CALANTONE, R. J. 2014. Common beliefs and reality about PLS: Comments on Rönkkö and Evermann (2013). *Organizational Research Methods*, 17, 182-209.
- HENSELER, J., HUBONA, G. & RAY, P. A. 2016. Using PLS path modeling in new technology research: updated guidelines. *Industrial management & data systems*, 116, 2-20.
- HU, L. T. & BENTLER, P. M. 1999. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6, 1-55.
- HUANG, J. & MARTIN-TAYLOR, M. 2013. Turnaround User Acceptance in the Context of HR Self-service Technology Adoption: An Action Research Approach. *International Journal of Human Resource Management*, 24, 621-642.
- IFENTHALER, D. & SCHWEINBENZ, V. 2013. The acceptance of Tablet-PCs in classroom instruction: The teachers' perspectives. *Computers in Human Behavior*, 29, 525-534.
- JOHNSON, T. P. & VAN DE VIJVER, F. J. 2003. Social desirability in cross-cultural research. *Cross-cultural survey methods*, 325, 195-204.
- JÖRESKOG, K. G. 1978. Structural analysis of covariance and correlation matrices. *Psychometrika*, 43, 443-477.
- KAN, Y. & MORGAN, D. 2018. Wenzhou-Kean University Produces New Graduating Class. *China Daily*, June 21, 2017.
- KARAHANNA, E., STRAUB, D. W. & CHERVANY, N. L. 1999. Information technology adoption across time: a cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS quarterly*, 183-213.
- KHECHINE, H., LAKHAL, S., PASCOT, D. & BYTHA, A. 2014. UTAUT model for blended learning: The role of gender and age in the intention to use webinars. *Interdisciplinary Journal of E-Learning and Learning Objects*, 10, 33-52.
- KLINE, R. B. 2010. *Principles and practice of structural equation modeling*. The Guilford Press.
- KOIVISTO, J. & HAMARI, J. 2014. Demographic differences in perceived benefits from gamification. *Computers in Human Behavior*, 35, 179-188.
- LATAN, H. & RAMLI, N. A. 2013. The Results of Partial Least Squares-Structural Equation Modelling Analyses (PLS-SEM).
- LAU, F. 1999. Toward a framework for action research in information systems studies. *Information Technology & People*, 12, 148-176.
- LAUMER, S., ECKHARDT, A. & TRUNK, N. 2010. Do as your parents say?—Analyzing IT adoption influencing factors for full and under age applicants. *Information Systems Frontiers*, 12, 169-183.
- LEIDNER, D. E. & KAYWORTH, T. 2006. A Review of Culture in Information Systems Research: Toward a Theory of Information Technology Culture Conflict. *MIS Quarterly*, 30, 357-399.
- MCNIFF, J. 2016. *You and your action research project*, Routledge.
- MERRIAM, S. B., CAFFARELLA, R. S. & BAUMGARTNER, L. 2007. Learning in adulthood a comprehensive guide. *The Jossey-Bass higher and adult education series*. 3rd ed. San Francisco: Jossey-Bass,.
- MOORES, T. 2005. An analysis of the impact of culture and wealth on declining software piracy rates: A nine-year study. *PACIS 2005 Proceedings*, 2.
- MUDAMBI, R., MUDAMBI, S. M. & NAVARRA, P. 2007. Global Innovation in MNCs: The Effects of Subsidiary Self-Determination and Teamwork*. *Journal of Product Innovation Management*, 24, 442-455.
- MUSCANELL, N. L. & GUADAGNO, R. E. 2012. Make new friends or keep the old: Gender and personality differences in social networking use. *Computers in Human Behavior*, 28, 107-112.
- PEACE, A. G., GALLETTA, D. F. & THONG, J. Y. L. 2003. Software Piracy in the Workplace: A Model and Empirical Test. *Journal of Management Information Systems*, 20, 153-177.
- PODSAKOFF, P. M. & MACKENZIE, S. B. 1994. An examination of the psychometric properties and nomological validity of some revised and reduced substitutes for leadership scales. *Journal of Applied Psychology*, 79, 702-713.
- PODSAKOFF, P. M., MACKENZIE, S. B., LEE, J. Y. & PODSAKOFF, N. P. 2003. Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88, 879-903.
- PREACHER, K. J. & HAYES, A. F. 2008. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40, 879-891.
- PUBLISHERS' ASSOCIATION, S. 1998. SPA's higher education initiative on software piracy. *Campus-Wide Information Systems*, 15, 128-130.
- RABBIOSI, L. 2008. The Impact of Subsidiary Autonomy on MNE Knowledge Transfer: Resolving the Debate'. *Center for Strategic Management and Globalization*.

- REASON, P. & BRADBURY, H. 2007. *The SAGE Handbook of Action Research: Participative Inquiry and Practice*, SAGE.
- RICHTER, N. F., SINKOVICS, R. R., RINGLE, C. M. & SCHLAEGEL, C. 2016. A critical look at the use of SEM in international business research. *International Marketing Review*, 33, 376-404.
- ROGERS, E. M. 2010. *Diffusion of innovations*, Simon and Schuster.
- SCHÖN, D. A. 1995. Knowing-in-action: The new scholarship requires a new epistemology. *Change: The Magazine of Higher Learning*, 27, 27-34.
- SCHREIBER, J. B., NORA, A., STAGE, F. K., BARLOW, E. A. & KING, J. 2006. Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of Educational Research*, 99, 323-338.
- SHEPPARD, B. H., HARTWICK, J. & WARSHAW, P. R. 1988. The theory of reasoned action: A meta-analysis of past research with recommendations for modifications and future research. *Journal of consumer research*, 15, 325-343.
- STANFIELD, D. & WANG, Q. 2015. Branch Campuses in China. *International Higher Education*, 13-15.
- STRAUB, E. T. 2009. Understanding technology adoption: Theory and future directions for informal learning. *Review of educational research*, 79, 625-649.
- SWANSON, R. A. & HOLTON, E. F. 2005. *Research in Organizations: Foundations and Methods of Inquiry*, San Francisco, Berrett-Koehler Publishers.
- TAYLOR, S. & TODD, P. A. 1995. Understanding information technology usage: A test of competing models. *Information systems research*, 6, 144-176.
- TEO, T. & NOYES, J. 2014. Explaining the Intention to Use Technology among Pre-Service Teachers: A Multi-Group Analysis of the Unified Theory of Acceptance and Use of Technology. *Interactive Learning Environments*, 22, 51-66.
- THOMPSON, R. L., HIGGINS, C. A. & HOWELL, J. M. 1991. Personal computing: toward a conceptual model of utilization. *MIS quarterly*, 125-143.
- VENKATESH, V. & DAVIS, F. D. 2000. A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, 46, 186.
- VENKATESH, V., MORRIS, M. G., DAVIS, G. B. & DAVIS, F. D. 2003. User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, 27, 425-478.
- VENKATESH, V., THONG, J. Y. & XU, X. 2016. Unified Theory of Acceptance and Use of Technology: A Synthesis and the Road Ahead. *Journal of the Association for Information Systems*, 17, 328-376.
- VENKATESH, V. & ZHANG, X. 2010. Unified theory of acceptance and use of technology: US vs. China. *Journal of Global Information Technology Management*, 13, 5-27.
- VINZI, V. E., CHIN, W. W., HENSELER, J. & WANG, H. 2010. *Handbook of partial least squares: Concepts, methods and applications*, Springer Science & Business Media.
- WANG, F., ZHANG, H., ZANG, H. & OUYANG, M. 2005. Purchasing pirated software: an initial examination of Chinese consumers. *Journal of consumer marketing*, 22, 340-351.
- WANG, Y., WU, M. & WANG, H. 2009. Investigating the determinants and age and gender differences in the acceptance of mobile learning. *British Journal of Educational Technology*, 40, 92-118.
- WILLIAMS, M. D., RANA, N. P. & DWIVEDI, Y. K. 2015. The Unified Theory of Acceptance and Use of Technology (UTAUT): A Literature Review. *Journal of Enterprise Information Management*, 28, 443-488.
- WKU. 2018. *Introduction of Wenzhou-Kean University* [Online]. Wenzhou, China. Available: <http://www.wku.edu.cn/wenzhou-kean-university/> [Accessed July 19 2017].
- WONG, K. K.-K. 2013. Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS. *Marketing Bulletin*, 24, 1-32.
- YOO, S. J., HAN, S.-H. & HUANG, W. 2012. The roles of intrinsic motivators and extrinsic motivators in promoting e-learning in the workplace: A case from South Korea. *Computers in Human Behavior*, 28, 942-950.

Appendix UTAUT Measurement for Legal Software Use

Using the Licensed MS Office Program for my school work... (= It)	Strongly Disagree	Disagree	Somewh at Disagree	Somew hat Agree	Agree	Strongly Agree
It enables me to accomplish tasks more quickly	1	2	3	4	5	6
It enhances my effectiveness on my work	1	2	3	4	5	6
It makes it easier to do my job	1	2	3	4	5	6
I would find it is useful in my job	1	2	3	4	5	6
If I use it, I will spend less time on routine job tasks	1	2	3	4	5	6
Learning to operate it would be easy for me	1	2	3	4	5	6
My interaction with it would be clear and understandable	1	2	3	4	5	6
I would find it is flexible to interact with	1	2	3	4	5	6
It would be easy for me to become skillful at using it.	1	2	3	4	5	6
I would find it is easy to use	1	2	3	4	5	6
It takes too much time from my normal duties (-)	1	2	3	4	5	6
Overall, I believe that it is easy to use	1	2	3	4	5	6
People who are important to me think that I should use the Licensed MS Office	1	2	3	4	5	6
I would use the Licensed MS Office if my friends use it	1	2	3	4	5	6
I have the resource necessary to use it	1	2	3	4	5	6
I have the knowledge necessary to use it	1	2	3	4	5	6
Given the resource, opportunities and knowledge, It would be easy for me to use	1	2	3	4	5	6
I think that it fits well with the way I like to work	1	2	3	4	5	6
It fits into my work style	1	2	3	4	5	6
I intend to use Licensed MS Office in my school work	1	2	3	4	5	6
I predict I will use it in my school work	1	2	3	4	5	6
I plan to use the Licensed MS Office in my school work	1	2	3	4	5	6