Studying College Lifestyles Affected by ICT

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ABSTRACT

This research aims to study the college lifestyles such as behaviors and the factors that affect the use of Information and Communications Technology (ICT) in the classes of undergraduates, postgraduates, doctoral students and faculties at King Mongkut's University of Technology Thonburi. The data were taken from 1023 research participants. A conceptual framework used in this research is Technology Acceptance Model (TAM). The instruments are questionnaires, and a 5 rating scale check-list survey. The statistical analyses were Percentage, Mean, Standard Deviation and Correlation coefficient of Person (r). The results suggest that Perceived Usefulness, Perceived Ease of Use, Attitude toward the Use of ICT, Behavior Intention to Use, and Actual System Use have an effect on the ICT behaviors of undergraduates, postgraduates, doctoral students and faculties. The results can be useful for those involved with the use of ICT in classrooms, and the development of ICT for learning which can be beneficial to both the students and the professors.

Keyword: ICT, Digital Learning, Technology Management, Digital University, University 4.0.

1. Introduction

For centuries technologies have been changing and new innovations are being discovered every day. These technologies play a crucial role in human lives whether in a positive or negative way. We then need to move on with the technologies, and learn to adapt ourselves to a new environment such as reading a newspaper, listening to a radio, or watching a television on a mobile phone or a computer. These are some examples of an effect of Information and Communications Technology (ICT).

Since the effects of ICT are wide-ranging, an awareness and an adoption of ICT in a learning society is important, especially at present when ICT is widespread and widely used in teaching which leads to extensive research on teaching and learning related to ICT to promote

education based on students' interests and aptitudes.

According to Ministry of Digital Economy & Society Thailand [1]. ICT is perceived as a more highly potential teaching tool than other teaching tools. This suggests that we can use ICT to improve the learning quality of students as well as the teaching quality of teachers. ICT can be used to store educational data and materials in a systematic way so anyone who is interested can access such information or make use of the data or materials collaboratively (ICT on Education Reform, 2552).

This use of ICT in education is also consistent with the Government's plans for economic and social development of digital Thailand BE 2559 - 2563 (Digital Economy) [2]. Digital Economy is the economy and society that use Information and Communications Technology (also known as digital technology).

Thus, ICT is an important mechanism to drive reforms as well as run business, trades, services, education, public health, and public administration. Therefore, the use of ICT covers both economic and social activities that lead to the economic development, improve the quality of people's life in the Thai society, and increase the employment opportunities (Digital Thailand).

The mechanisms to promote digital economy are promoting online community stores via digital community centers, coaching SMEs to go online and standardize product items, developing digital clusters under the government's super cluster policy, and encouraging digital technology startups to innovate and create new products and services (Digital Thailand).

Digital Thailand plan is created with six strategies [3]: (1) Build a country-wide and high-capacity digital infrastructure, (2) Boost the economy with digital technology, (3) Create a quality and equitable society through digital technology, (4) Transform the government into the digital government, (5) Develop workforce for the digital era, and (6) Build trust and confidence in the use of digital technology (Digital Thailand). All of these are related building hard infrastructure across the country and introducing the Internet to remote villages, so that more people can get access to the Internet. Another related issue is creating a Digital Learning System that contributes to lifelong learning and digital media related to the public interest and consistent with the needs of electronic services of the public, potentially leading to increased revenue, reduced expenses, and better infrastructure facilities.

According to Digital Thailand 2016 plan, its 3rd strategy says, "Build a quality society with digital technology by creating fair use and equality throughout the country". The actions include ensuring inclusive and equal access to digital technology, developing digital literacy/media and information literacy, creating local digital contents and knowledge resources, providing education opportunities with digital technology, and increasing access to healthcare with digital technology (Digital Thailand). The goal is to ensure that people of all groups with different abilities will be able to access and

make use of digital technology, so they become digitally literate, and have access to education, healthcare, and essential public services via the digital means. In short, this means creating Digital Learning in Digital Society.

Also, the 4th strategy of Digital Thailand plan says, "Transform the government into a digital government by facilitating fast and convenient services". The actions include transforming to citizen-centric smart services, increasing efficiency and good governance with digital technology, promoting open data and civic participation, and developing government service platforms to encourage new services (Digital Thailand). The goal is to make government services meet the demands of people and businesses with speed, accuracy, and convenience. This will help people to easily access government data to ensure transparency and civic participation. To provide such access, government functions need to be integrated into the government infrastructure (Digital Thailand).

While ICT has benefits for classrooms such as an easy access to a large amount of information making learning new things easy, it may have some other effects such as changing ways of learning, or relationship among students who interact in or do group work through online learning platforms. These effects have not given sufficient attention.

Therefore, we focus on digital learning by digital lifestyles. It is hoped that exploring this issue will help us understand more about (1) relationships within the social network that can lead to the development of relationships in a

society in a more intimate way leading to the real effective exchange, and (2) issues related to a plan to formulate policies for the university to make use of various technologies in enhancing learning and teaching.

Fig.1 Digital Thailand 6 strategies

Source: https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2016/Apr-Digital2016/S2_Present_Pansak_Siriruchatapong.pdf

1.1 Objectives of Study

1) To study the behaviors of postgraduates, doctoral students and professors related to the use of ICT in learning and teaching at King Mongkut's University of Technology, Thonburi.

2) To study the relationship among the perceived benefits and the perceived ease of usage, and the behaviors of the students in the use of ICT in Master and PhD courses.

3) To summarize the results from the survey to make recommendations on the development of ICT.

2. Materials and Method

2.1 Research Model

In studying the behaviors of post-graduates, doctoral students and professors related to the use of ICT in learning and teaching at King Mongkut's University of Technology, Thonburi, a conceptual frame-work concept was used and is presented in Fig. 2.
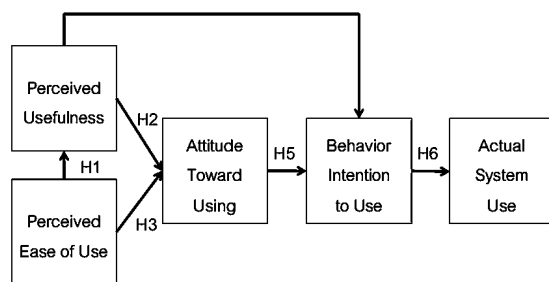

Fig.2 Conceptual Framework and Theoretical Research on technology adoption. (TAM) [4]

2.2 Assumptions

H1: External Variable of use effects in Perceived Usefulness in using Information and Commu-nications Technology in the course. (EV ➔ PU)

H2: Perception Ease of Use effects in Perceived Usefulness in using Information and Communications Technology in the course. (PEOU ➔ PU)

H3: External Variable of use effects in Perception Ease of Using Information and Communications Technology in the course. (EV ➔ PEOU)

H4: Perceived Usefulness of use affects Attitude toward the use of Information and Communications Technology in the course. (PU➔A)

H5: Perceived Ease of Use affects Attitude toward the use of Information and Communications Technology in the course (PEOU ➔ A).

H6: External Variable of use affects Behavior Intention to the use of Information and Communications Technology in the course (EV ➔BI).

H7: Perceived Usefulness of usage affects Behavior Intention to the use of Information and Communications Technology in the course (PU ➔BI).

H8: Attitude toward the use of ICT affects Behavior Intention to the use of the system and Information and Communications Technology in the course (A➔BI).

H9: Behavior Intention to use affects Actual Use on the adoption of Information and Communications Technology in the course (BI ➔U).

3. Results and Discussion

In this study, 32 sets of questionnaire were checked for the reliability by Cronbach's Coefficient Alpha scale. [5].

TABLE I

Summary of Reliability Analysis

Variables	Cronbach's Alpha
External Variable	0.822
Perceived Usefulness	0.871
Perceived Ease of Use	0.883
Attitude toward the Use of ICT	0.885

TABLE I

Summary of Reliability Analysis (Cont.)

Variables	Cronbach's Alpha
Behavior Intention to Use	0.892
Actual System Use	0.804

The reliability test results of the research instrument presented in Table I reveals that all questions were consistent and reliable to be applied as the research instrument in this study with Alpha greater than 0.60.

TABLE II

Summary of Correlation Analysis

	EV	PU	PEOU	A	BI	U
EV	1.000	0.657	0.621	0.657	0.700	0.713
PU	0.657	1.000	0.875	0.819	0.823	0.688
PEOU	0.621	0.875	1.000	0.812	0.801	0.686
A	0.657	0.819	0.812	1.000	0.895	0.762
BI	0.700	0.823	0.801	0.895	1.000	0.807
U	0.713	0.688	0.686	0.762	0.807	1.000

Table II shows the results of Pearson Correlation Coefficients. Each variable is statistically significant at 0.01 and is in the same direction. More detailed explorations of such results are presented below.

1) Factors that affect the behavior of usage

TABLE III

The relationship between the factors affecting the intended usage. (Multiple Linear Regression)

Regression Test	Adjust R Square	B	Std. Error	Sig.
(Constant)		-0.193	0.113	0.088
BI	0.837			
EV		0.181	0.034	0.000
PU		0.242	0.041	0.000
A		0.619	0.037	0.000

Following:

EV = External Variable

PU = Perceived Usefulness

A = Attitude toward the Use of ICT

BI = Behavior Intention to Use

From Table III, it is found that relationship level between three factors (that is, external factor, perceived benefits as well as attitude to use) and behavior of intended usage at the level of Adjust R Square at 0.837. This suggests that external factors, perceived benefits as well as attitude to use affect the intended usage at 83.7%. Each factor is equal to the significant level at 000.0 which is statistically less significant than at the 0.05 level, so we can accept assumptions H6, H7, and H8, and these can be written as a multiple regression equation shown below.

$$BI = (-0.193)+0.181(EV)+0.242(PU)+0.619(A) \quad (1)$$

From the equation, it is found that when one EV increases, the BI Increases by 0.181 units,

given that other variables stay unchanged. When one PU increases, the BI increases by 0.242 units given that other variables remain unchanged. If the value of A increases by 1, BI will increase by 0.619 units given the other variables stay still. When all variables are 0, the BI is -0.193.

TABLE IV

The relationship between factors affecting to the Actual System Use

Regression Test	Adjust R Square	B	Std. Error	Sig.
(Constant)		0.161	0.133	0.228
A	0.709			
PU		0.512	0.062	0.000
PEOU		0.416	0.058	0.000

Following:

PU = Perceived Usefulness

PEOU = Perceived Ease of Use

A = Attitude toward the Use of ICT

From Table IV, it is found that the attitude toward using (A) factors are related to perceived benefits (PU) and perceived ease of use (PEOU) at the level of Adjust R Square at 709.0. This implies that perceived benefits (PU) and perceived ease of use (PEOU) have an influence on attitude to use (A) 70.9%. Each factor is equal to the significant level at 0.000 which is statistically less significant than at the 05.0 level, so we can accept assumptions H4 and H5 which can be written as a multiple regression equation shown below.

$$A = 0.161 + 0.512(PU) + 0.416(PEOU) \qquad (2)$$

If a PU is increased by 1 unit, A will increase by 0.512 units given that the other variables are unchanged. If one PEOU is increased, A will increase by 0.416 units given that the other variables remain the same. When all variables are 0, A is 0.161.

Hence, it is found that perceived benefits (PU) to use is a factor that can increase the level of attitude to use with the highest rate (0.512 units). To understand more about PU, Table V shows the related factors.

TABLE V

The relationship between factors affecting Perceived Usefulness. (Multiple Linear Regression)

Regression Test	Adjust R Square	B	Std. Error	Sig.
(Constant)		0.358	0.116	0.002
PU	0.785			
EV		0.202	0.033	0.000
PEOU		0.706	0.028	0.000

Following:

EV = External Variable

PU = Perceived Usefulness

PEOU = Perceived Ease of Use

From Table V, it is found that perceived benefits (PU) relates to external factor (EV) and perceived easy to access (PEOU) as Adjust R Square is equal to 0.785. As the result, external factor (EV) and perceived easy to access (PEOU) affect attitude to use level (A) 78.5% Each factor is equal to the significant level at 0.000 which is statistically less significant than at 0.05, so we

can accept assumptions H1 and H2 which can be written as a multiple regression equation as

$$PU = 0.358 + 0.202(EV) + 0.706(PEOU) \quad (3)$$

If one EV is added, the PU will increase by 0.202, given that the other variables remain unchanged. If one PEOU increases, the PU will increase by 0.706 units, given that the other variables stay unchanged. When all variables are 0, the PU is 0.358.

However, it is found that perceived easy to access (PEOU) to use is a factor that can increase the level of attitude to use at the highest rate (0.706 units).

To understand more about PEOU, Table VI reveals other its relationship with related factors.

TABLE VI

The relationship between factors affecting perceived easy to access. (Multiple Linear Regression)

Regression Test	Adjust R Square	B	Std. Error	Sig.
(Constant)		1.286	0.201	0.000
PEOU	0.384			
EV		0.731	0.047	0.000

Following:
EV = External Variable
PEOU = Perceived Ease of Use

From Table V, it is found that perceived easy to access (PEOU) is related to external factor (EV) as the Adjust R Square is equal to 0.384. As a result, external factor (EV) affects perceived easy to access (PEOU) 4.38%. The external factor has the significant level at 0.000 which is statistically less significant than at the 05.0, so we can accept assumption H3 which can be as a written multiple regression equation as

$$PEOU = 1.286 + 0.731(EV) \quad (4)$$

If one EV is added, the PEOU will increase by 0.731, given that the other variables stay unchanged. When EV is 0, the PEOU is equal to 1.286 units.

2) Factors that affect system usage (Actual System Use). The findings in the previous section show the relationship of factors related to the intention to use the technology. This section will show the relationship of the factors that affect the acceptance of the Actual System Use (U) as following.

TABLE VII

The relationship between factors affecting to the Actual System Use (Multiple Linear Regression)

Regression Test	Adjust R Square	B	Std. Error	Sig.
(Constant)		0.478	0.135	0.000
U	0.650			
BI		0.849	0.032	0.000

Following:
BI = Behavior Intention to Use
U = Actual System Use

From Table VII, it is found that the relationship level between behavior intention to use (BI) and actual system use (U) is at the level of Adjust R Square 0.650 which suggests that behavior intention to use (BI) affects to actual system use (U) 65.0%. Behavior Intention to use factor (BI) has the significant value at 0.000 which is statistically less significant than at 0.05, so we can accept assumption H9 which can be written as a multiple regression equation as

$$U = 0.478 + 0.849(BI) \qquad (5)$$

If one BI increases, U will increase by 0.849, given that the other variables stay unchanged. When BI is 0, U is 0.478.
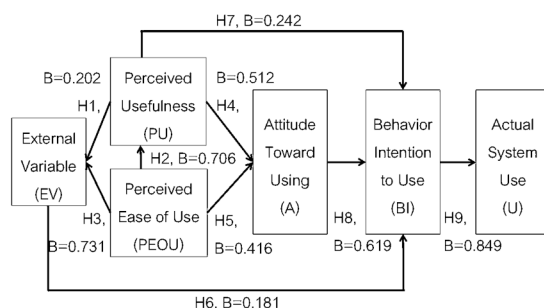
The results can be summarized as in Fig.3.

Fig.3 The research framework displays the relationship between factors and behavior intention to use. It affects the actual use by the coefficient of predictive variables in the form of raw scores.

Fig. 3 shows the research framework Technology Acceptance Model: TAM to predict the adoption of technology. It is found that TAM is a model that can explain the relationship of

factors to the intention to use. This result affects students' use of ICT as followings.

1) Behavior Intention to Use: This study shows that three factors that highly affect the intention to use (83.7%) are external factors, perceived benefits as well as attitude to use. This can be explained that when the students have the intention to make use of ICT, when they know about external factor (B=0.081) such as the good quality and the stable connection of the Internet as also revealed as perceived profit (B=0.242). They can use social networks to learn new things, connect or update information with colleagues.

Moreover, the intention to use affects the attitude in using ICT (B=0.619). They can update the way to study the changing of technology, essence of learning via internet by ICT devices such as smartphones, tablets, and notebooks. Besides, ICT such as the use of smart phones or notebooks is brought into learning, the intention to use ICT is also increased.

The results are consistent and different from Timothy Teo [6], who studied the effectiveness of the Technology Acceptance Model (TAM). Similar to Teo (2011), this study found that the variables that could explain the intention to use the technology were the same as the perceived benefits of using the technology, as well as attitude to use technology. However, some findings in the current study are different from Teo (2011). In Teo's work, there is an easy perception of use as a common variable describing the intent to use technology.

However, in this study, it was found the relationship of external factors with the easy perception of use (B=0.731). Moreover, it is found that external factors related with perceived benefit (B = 0.202). This result is similar to Davis, Bagozzi, Warshw's research [7] which found that external factors are likely to influence the perceived benefits of information technology and the ease of use. This will lead to the adoption of people in using information technology eventually. Also, Andrew Burton-Jones, Geoffrey S. Hubona's research [8] that found external variables affect perceived ease of use and perceived benefits which lead to a belief of attitude and actual usage behavior.

2) Actual System Use: The study also found that the effect of behavior intention to use on the actual use of technology by university students was quite high (1.65%). To explain that, each student has the intention to show one's behavior based on the potential positive effects of the use [9] When university students show their intention to use at a higher level, it will affect the adoption of ICT-based learning systems such as online classroom, online library as well as online search by increase (B = 0.849). This is similar to the findings of Napaporn Chatmaneerung [10]. The TAM was used to display the factors that contributed to the acceptability of E-Learning technology in the form of supplementary media. It is found that when the teacher uses E-learning as the supplementary media, the students have a higher level of intention to learn. This has resulted in the acceptability of E-Learning in the learning process.

4. Interpretations and Analysis of Results

The results of this study suggest that bringing Information Technology to be used in the course or in teaching undergraduates, postgraduates, and doctoral students has benefits and can develop Information Technology for studying in class as following.

1) In terms of Perceived Usefulness, the use of ICT should be promoted. Teachers and students can use ICT in classroom and research. For example, teachers may encourage students to search for the course contents, to learn through the Virtual Classroom, to interact with other students by using questions, or to communicate with the teacher. With a large media contents over the electronic system that can be used to support optimal learning and human capital development program, the students and teachers can create and use information effectively, improve critical literacy, develop ICT knowledge, and increase expertise with international standards.

2) In terms of Perceived Ease of Use of ICT, teachers and students should be encouraged to use the Mobile Application in teaching and researching to enhance the ability of teachers and education officers to use Information and Communications Technology for education. Then, teachers and educational officers will

develop the ability of using Information and Communications Technology for education.

3) In terms of Attitudes toward the Use of ICT in teaching, teachers and students should be encouraged to use the Virtual Lab and Mobile Application laboratory models to understand the course contents.

4) In terms of Information and Communications Technology usage in the course, The University should maintain the stability of the ICT network. The network should always be in a good condition in order to meet the demand of teachers, students, and university officers who use the Internet. The infrastructure of Information Technology should be standardized for e-service education which needs the unity information database. The development of ICT infrastructure which has a high speed Internet or Broadband should be available to all users in different sectors.

5) The university should develop a communication system to be more efficient in terms of expansion of the Internet speed, the access point, and the service area of wireless network (WIFI) to cover the areas within the universities to support researching and learning outside the classroom. This system also needs to be flexible, stable, and has a high level of security.

6) In terms of Internet Access, we need to be aware that apart from the Internet usage at the university. Houses, dormitories and apartment as the main points for access, there is a need to consider the number of students. The university should cooperate with operators in offering mobile Internet connections or Fixed Broad Band for a special rate for the students to support Information access on education at a reasonable price.

7) In terms of providing advice and services, students should be provided with an easy access to the advice or services such as central contact questions & answer, or suggestions on applications related to the use of ICT, especially when they need help.

5. Conclusion

The results indicate that the perceived usefulness, the perceived ease of use, the attitudes toward performance, the external variables, the quality of internet signal, the system stability and the multi-device capability, the multi-devices, and the multi-platforms of ICT systems have an influence on the intention to use ICT and the real use of the systems of graduate students, master's degree students, doctoral students, and faculty members of King Mongkut's University of Technology Thonburi.

6. Suggestions for further research

Further research can be done on the following topics:

1) To study groups of high school students in other schools,

2) To study groups of undergraduate, master and PhD students, and professors in other universities,

3) To compare Information and Communications Technology usage behaviors in courses at different educational levels,

4) To study other factors that affect the use of Information and Communications Technology in other courses such as personal factors, risk perceiving, or the environment impact.

7. References

[1] Ministry of Information and Communication Technology (Ministry of Digital Economy & Society), Thailand Information and Communication Technology Policy Frame-work 2011-2020, (ICT 2020), 2011, pp. 13-65. [Online]. Available: http://www.mdes. go.th/view/10/All%20News/e-Publication/25

[2] Ministry of Information and Communication Technology (Ministry of Digital Economy & Society), 2558, Digital Economy & Society Development Plan 2016-2020. [Online]. Available: http://www.digitalthailand.in.th/ digital-economy

[3] Ministry of Information and Communication Technology (Ministry of Digital Economy & Society), Digital Thailand 6 strategies [Online]. Available: https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2016/Apr-Digital2016/S2_Present_Pansak_Siriruchatapong.pdf

[4] F. D. Davis, "Perceived Usefulness, Perceived ease of use, and User Acceptance of Information Technology." *MIS Quarterly*, vol. 13, no.3, pp. 319-339, September 1989.

[5] Cronbach, Lee J., "Essentials of psychological testing," Harper and Row, New York: London, 1970.

[6] Timothy Teo, "Efficiency of the technology acceptance model to explain pre-service teachers' intention to use technology: A Turkish study," *Campus-Wide Information Systems*, vol. 28, no. 2, pp. 93-101, 2011.

[7] F. D. Davis, R. P. Bagozzi, & P. R. Warshaw, "User acceptance of computer technology: A comparison of two theoretical models," *Management Science*, vol. 35, no. 8, pp. 982-1003, August 1989.

[8] Andrew Burton-Jones, Geoffrey S. Hubona, "The mediation of external variables in the technology acceptance model," *Information & Management*, vol. 43, Issue 6, pp. 706-717, September 2006.

[9] Ajzen & Fishbein, "Understanding attitudes and predicting social behavior," Englewood Cliffs, N.J.: Prentice-Hall, 1980.

[10] Napaporn Chatmaneerung. A study of teaching and learning acceptance of e-learning for teacher and undergraduated students Kasesart University, *Kamphaeng Saen Campus*. Vol. 5, No. 2., pp. 388-389, 2011.