

8-5-2011

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Facebook © Adoption as Computer-Mediated Communication for University Students

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ABSTRACT

Social communications and collaborations have been ranked as one of key information technology trends. Social networks are social collaboration tools that have shown clear benefits for education in terms of providing informal learning, joining students to communities, exchanging support in studying, and promoting relationships in classes. Therefore, major objectives of this paper are to investigate factors affecting Facebook acceptance as the computer-mediated communication for courses, to explore different levels of the factors' influence, and to guide instructors for effectively applying social networks in education. The survey approach using questionnaires along with multiple regressions were applied to reveal results. The results show that two perception factor: perceived usefulness, perceived ease of use, and one instructor factor: instructor characteristics are determinants of the course Facebook pages adoption, but student factors which are student characteristics and past behavior are not determinants. In terms of theoretical contribution, this research has extended TAM and TPB models with some aspects of teachers and learners.

Keywords

Social Network Sites, Technology acceptance model (TAM), Facebook, Computer Supported Learning

INTRODUCTION

Social networks are social-tie structures that let people connect, socialize, and exchange resources. Social networks are strongly different from other networks in terms of their division into communities (Newman and Park 2003). According to the academic evidence, there are distinct advantages for schools to draw upon social networks in informal learning (Potter, 2006). Social networks can attract people to join common interest communities, to help each other in their academic studies, to build bonds with their classmates, and to promote the supplementary interaction between them and their instructors (Griffith and Liyanage, 2008). Online social networks are also confirmed to be effective teaching tools because of their rationality and cost-effectiveness. It is rational since most students already use the system. It is cost-effective because the network infrastructures are ready-to-use (Towner et al., 2007). Facebook is the most popular social network which reaches more than 500 million active users as of January 31, 2011. It provides various features including wall, pokes, news feeds, photos, etc. According to Facebook statistics, people spend over 700 billion minutes per month using those services. Mack et al. (2007) present the success case of adopting Facebook for communicating between Penn State students and librarians. The Facebook profiles allow librarians to provide useful contents such as contact information for students. Students also feel that they receive more comfortably support from librarians due to disclosures of the librarians' identities.

Some previous research studies on social networks and their applications in education. For example, Yang and Tang (2003) explore relationships between various kinds of networks: friendship network, advising network, and adversarial network, on students' performance. The result indicates that friendship network has no effect on students' performance. However, advising network is a good determinant of students' performance both in the class and on the forum and adversarial network affects students' performance on the forum (Yang and Tang, 2003). Online discussion group is added to be an enhanced tool for the child observation in Cooper's class. The result reveals that online group work is very appropriate for an accelerated course in the students' opinions (Cooper, 2009). Warrick and Connors investigate graduate students' views on learning experiences, peer interactions, and the ease of use of three communication modes: e-mail, bulletin board, and synchronous chat for collaborative group work. The result shows that all modes are viable channels for interaction (Kelly, 2009). Mazman and Usluel (2009) propose a model containing of four factors influencing four direct constructs which tend to affect the social network usage in education. Four incorporated factors are facilitating conditions, image, subjective norms and community identity. Four direct constructs are social factors, perceived ease of use, perceived usefulness and innovativeness. However, the model testing and the hypotheses verifying process are postponed to be their future works. They also study students'

Facebook adoption process in the educational use. The result is found that Facebook is used for communication, collaboration and resource or material sharing. The adoption positively relates to usefulness, ease of use, social influence, facilitating conditions and community identity and the students' purposes positively relates to users' social relations, work related issues and daily activities (Mazman and Usluel, 2010). Cheung et al. (2010) discover factors driving We-intention, the commitment of a student to participate in joint action, to use Facebook. The result specifies that most influence factor is the social presence. Visagie and de Villiers (2010) seek for the reasons why lecturers of Information Systems and Computer Science departments in South Africa, United States of America, Canada, United Kingdom, and Australia, apply or not apply Facebook as an academic tool. The result indicates that lecturers from South Africa, Australia, Canada, United States of America, and United Kingdom consider Facebook as the tool respectively. However, none of these studies investigate constructs related to instructor characteristics, student characteristics, and past behavior.

Thus, this paper aims at to extend prior research by integrating the technology acceptance model (TAM) and DeLone and McLean's model with instructor characteristics, student characteristics, and their past behaviors; to explore the results from different environments; to compare different impacts of perception factors to adopt Facebook (perceived usefulness and perceived ease of use), instructor factor (instructor characteristics), and student factors (student characteristics and past behavior); and to guide instructors in effectively persuading students to join the class communities. The quantitative research method using survey questionnaires are applied to reveal the results.

RESEARCH MODEL AND HYPOTHESES

Various researches described as follows were explored to form the proposed research model in Figure 1.

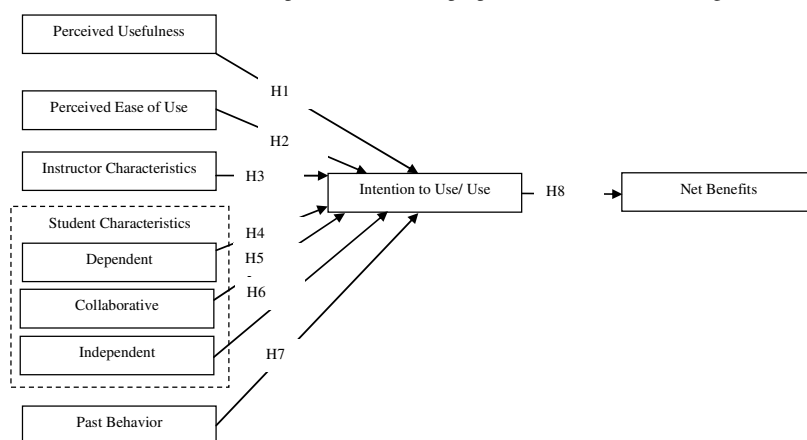


Figure 1. The Proposed Research Model

Perceived Usefulness

Technology acceptance model (TAM) is a theory which is widely accepted in the information systems field. The theory indicates that two main constructs affecting user intentions to adopt technology are perceived usefulness and perceived ease of use (Davis, 1989). From the first theory presentation, the theory has been developed from time to time. TAM3 is proposed by Venkatesh and Bala (2008) to determine antecedents of perceived usefulness and perceived ease of use in the workplace environments. Determinants of perceived usefulness in TAM3 are subjective norm, image, job relevance, output quality, and result demonstrability and determinants of perceived ease of use in TAM3 are computer self-efficacy, perceptions of external control, computer anxiety, computer playfulness, perceived enjoyment, and objective usability respectively. Perceived usefulness is confirmed to be the strongest predictor of behavioral intention for all time period of using information technologies. Perceived usefulness positively impacts intention to use social networks sites in general context (Sledgianowski and Kulviwat, 2008). Usefulness is also supported to be most influence factors in predicting Facebook adoption in an educational context (Mazman and Usluel, 2010) Hence, this research proposes the hypothesis as follows:

H1: Perceived usefulness has the positive effect on the intention to use/ use.

Perceived Ease of Use

Ease of use is another factor that is frequently pointed to be an antecedent of intention to apply various information systems. TAM3 also points that perceived ease of use is significantly related to new information technologies adoption in the workplace, especially in the earlier stage of adoption (Venkatesh and Bala, 2008). Like perceived usefulness, perceived ease of use has a significant positive effect on intention to accept general social network sites as well (Sledgianowski and Kulviwat, 2008). In addition, perceived ease of use is found to have a positive effect on Facebook adoption in educational usage (Mazman and Usluel, 2010). Hence, this research proposes the hypothesis as follows:

H2: Perceived ease of use has the positive effect on the intention to use/ use.

Instructor Characteristics

Volery and Lord (2000) identify instructor characteristics; in the aspects of attitudes towards students, instructor technical competence, and classroom interaction, to be one of critical success factors in e-learning. Instructor characteristics in terms of instructor's attitude towards and control of the technology and instructor's teaching style are also confirmed to be critical success factors for e-learning acceptance by Selim (2007). Marzer et al. (2007) identify that instructor who personalizes teaching through the use of humor, stories, enthusiasm, and self-disclosure are perceived to be effective in describing the course content (Mazer et al., 2007). Hence, this research proposes the hypothesis as follows:

H3: Instructor characteristics have the positive effect on the intention to use/ use.

Student Characteristics

Teaching styles of instructors and learning styles of students impact learning and attitude in the introductory economic course. Students' learning styles are categorized to be collaborative, independent, and dependent. *Collaborative* learners like classes with as many discussions or students' interactions as possible. *Independent* learners prefer to express their opinions about the courses' structures and contents. *Dependent* learners like lecture-based classrooms and prefer instructors to direct them (Charkins et al., 1985). Hativa and Birenbaum (2000) also specify that various learning needs of students require suitable responses to fulfill them. For example, students with any of strategies or motives described in Motivated Learning Strategies Questionnaires (MISQ) do not like information-transmitting instructors. Students who aim at earning the good grades only prefer instructors who help them to achieve their goals without high thinking effort. Students who have high intrinsic goal drives and low extrinsic goal drives want instructors to put high demands on their learning, to encourage critical thinking, and to ask for their self-studies and effort investments.

Diaz (1999) explores students' learning styles in online distance learning and equivalent on-campus learning. The result reveals that distance students favor independent learning styles. Students who like independent, self-paced instruction would self-select into an online class. Dependent learners who prefer instructor's guidance attend more in the on-campus class than the distance group. In addition, Diaz (2000) indicates that successful online students (grade better than 'C') are independent learners more than non-successful online students (grade 'D', 'F', or 'W'). Successful students with independent learning style also negatively related ($p < 0.01$) to collaborative learning style and dependent learning style. This means independent learners are not tied to the preference for external structures and guidance from their instructors and the needs for collaborations with their classmates. Hence, this research proposes the hypotheses as follow:

H4: Student characteristic (Dependent) has the negative effect on the intention to use/ use.

H5: Student characteristic (Collaborative) has the positive effect on the intention to use/ use.

H6: Student characteristic (Independent) has the positive effect on the intention to use/ use.

Past Behaviour

Past behavior or past habit is confirmed to affect intentions and behavior in the theory of planned behavior (TPB) (Conner and Armitage, 1998). Regan and Fazio (1977) conducted a field study and a laboratory experiment to explore the method of attitude formation. The result from both the field study and the laboratory experiment shows that direct behavioral experience produces greater attitude-behavior consistency; which is more clearly, confidently, and stably maintained, than attitude formed by other means. Moreover, attitude-behavior consistency is also supported to be related to the amount of direct experience with attitude object (Fazio and Zanna, 1978). Early et al. proposed that knowledge taken from the past experience or past behavior helps in shaping intentions (Eagly et al., 1993). Lim (2002) specifies that the level of exposure to have knowledge or experience with the system may influence the magnitude of intention to adopt. Past experience with other

new systems can be beneficial for negotiation support systems (NSS) in the aspect of providing managers with support or resistance level of employees to the system. Hence, this research proposes the hypothesis as follows:

H7: Past behavior has the positive effect on the intention to use/ use.

Intention to Use/ Use

DeLone and McLean model is extensively used for assessing information systems success. The update version of D&M IS success model evaluates the IS quality in three dimensions: information quality, system quality, and service quality. These quality dimensions affect intention to use/use and user satisfaction. The intention to use/use and user satisfaction influence net benefits conversely (DeLone and McLean, 2003). Holsapple and Lee-Post (2006) proposed e-learning success model on the basis of DeLone and McLean’s updated success model. The success of delivery e-learning system is evaluated by the net benefits dimension. Towner et al. (2007) indicate that 56 percents of students agree that Facebook is a useful tool for them and their class-related collaborations in contacting their classmates about questions, assignments, or examination, obtaining lecture notes, setting up meetings, forming study groups. Facebook is also likely to increase class participation both in the classroom as well as the online channel. Benefits in the aspect of connecting students into collaborative learning networks are also support by Selwyn (2007). Learning benefits are pointed to be accrued from collaborative learning. Social interaction and collaborative activities can help students to improve their motivations and to avoid isolation feelings, especially in online courses (Shank, 2009). Hence, this research proposes the hypothesis as follows:

H8: Intention to use/use has the positive effect on the net benefits.

RESEARCH METHODOLOGY

Participants and Procedure

Survey-based approach, with the convenience sampling, is applied to test proposed hypotheses. Participants are students of Thammasat Business School, Thammasat University, who registered the classes which apply Facebook as an additional tool for communication. Observed classes consist of 6 management information systems classes, 4 financial classes, and 3 accounting classes. 510 paper questionnaires were sent. 240 questionnaires were received, with a response rate 47 percent. 16 papers were filtered out due to their incompleteness. Finally, 224 paper questionnaires were ready for the data analysis phase.

Measures

Two main sections of a questionnaire consists of a section about opinions and respondent’s usage behavior of the course Facebook pages and a section about respondent’s personal information and usage behavior of his/her own Facebook pages. Three independent variables (i.e. *perceived usefulness*, *perceived ease of use*, and *instructor characteristics*), *intention to use*, and *net benefits* contain 35 items. These items were asked using the question “What do think about the following statements?”. The answers were rated using five points Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. *Student characteristic*, preference of Facebook services, frequent access device, and gender are collected in nominal scales. Ratio scale is used to explore each respondent’s *past behavior* of his/her Facebook page’s adoption. Table 1 shows the literature source for developing the questionnaire along with some statement examples.

Construct	Items	Sample Statements/ Questions	Literature Sources
Perceived Usefulness	USEF1-USEF4 (5 points Likert scale)	“Using the course Facebook pages will enhance my learning efficiency”, “The course Facebook pages will be useful to me”	(Venkatesh and Bala, 2008)
Perceived Ease of Use	EASE1-EASE4 (5 points Likert scale)	“I do not need so much time to learn how to use the course Facebook pages”, “Using the course Facebook pages is easy for me”	(Venkatesh and Bala, 2008)
Instructor Characteristics	INCH1-INCH4 (5 points Likert scale)	“Teacher always encourages me to participate in the class”, “Teacher pays attention to students such as giving suggestions, answering questions, etc.”	(Selim, 2007)

Student Characteristics	STCH1-STCH3 (Nominal scale: yes/no)	“I prefer to mainly have lectures in the classroom. I like the teacher to set topics and to describe clear details of assignments to me” – Dependent, “I like learning with as many as classroom discussions and interactions. I prefer group projects or learning from case studies.” – Collaborative, “I like to participate in determining the course content and structure. If any assignments are given, I prefer to set the topics.” – Independent	(Charkins et al., 1985)
Past Behavior	PAST (Ratio scale: months)	How long have you used Facebook?	(Conner and Armitage, 1998)
Intention to Use/ Use	INTU1-INTU3 (5 points Likert scale)	“If I can access the course Facebook pages, I will use it.”, “I will use the course Facebook pages during this one or two weeks”	(Venkatesh and Bala, 2008; Holsapple and Lee-Post, 2006)
Net Benefits	NB1-NB4 (5 points Likert scale)	“After using the course Facebook pages, I understand the subject more.” “After using the course Facebook pages, it reduces the time spent to communicate with classmates or teacher outside the classroom such as the time spent for answering questions, the time spent for giving comments, etc.”	(Holsapple and Lee-Post, 2006)

Table 1. Literature Review for Developing Survey Instrument

DATA ANALYSIS AND FINDINGS

The profiles and usage behaviors of participants’ Facebook pages were firstly analyzed using descriptive statistics. Secondly, the survey instrument was assessed the construct reliability and validity. Thirdly, factor analysis was performed to link items to their underlying factors. Lastly, the relationships between independent variables and dependent variables are examined using multiple regressions.

Descriptive Statistics

Descriptive statistics using frequency and percentage are applied to summarize the participants’ profiles and usage behaviors. Details of the result are described in Table 2. These frequencies and percentages were calculated based on responded questions. However, some missing answers are still taken into account in the percentage calculations. 143 students (63.8%) are female and 80 students (35.7%) are male. Most frequently used services on the course Facebook pages are wall (49.11%), discussion board (26.79%), photos (11.16%), and videos (1.34%) respectively. However, some students access the course Facebook pages only for viewing the contents but not giving any posts or comments (8.93%). Majority (96.4%) of students access their Facebook pages approximately 1-5 times per day or less than 1 time per day. The main access devices are personal notebook computers (53.6%), personal desktop computers (25%), mobile phones (11.6%), and public school computers or internet cafes (5.4%) successively.

Variable	Frequency	Percentage
Gender		
Male	80	35.7

Female	143	63.8
Most Frequently Used Feature of the Course Facebook Pages		
Wall	110	49.11
Discussion Board	60	26.79
Photos	25	11.16
Videos	3	1.34
Links	0	0
Events	0	0
Never Posts or Comments	20	8.93
Average Frequency of Using His/Her Own Facebook Pages (Times/ Day)		
Less than 1	99	44.2
1 – 5	117	52.2
6 – 10	7	3.1
More than 10	1	0.45
Main Access Equipment		
Personal Notebook Computer	120	53.6
Personal Desktop Computer	56	25
Mobile Phone	26	11.6
Public School Computer/ Internet Café	12	5.4
Others	0	0

Table 2. Additional Details of Respondents

Reliability Assessment

The construct reliability was tested according to assessing the Cronbach's alpha. Table 3 shows reliability coefficients of each variable. All of five factors are relatively high, most are greater than 0.84. So, internal consistencies are therefore adequate for all constructs.

Variable	Cronbach's alpha
Perceived Usefulness	0.895
Perceived Ease of Use	0.869
Instructor Characteristics	0.844
Intention to Use/ Use	0.853
Net Benefits	0.869

Deleted: ¶

Table 3. Cronbach's Alpha Analysis

Factor Analysis

Factor analysis was applied to examine convergence validity and discriminant validity. Principal axis factoring with the varimax rotation was applied to determine the constructs and their corresponding items. Convergence validity is achieved by setting the cut-off point to be factor loadings greater than 0.5. Discriminant validity is performed by checking that whether

items were loaded with the associated factor more than others. Therefore, three factors with eigenvalues greater than 1 are extracted. These factors can explain 64.2 percent of the cumulative variance as given details in Table 4.

	Factor 1	Factor 2	Factor 3
USEF1	0.804		
USEF2	0.788		
USEF3	0.741		
USEF4	0.779		
EASE1		0.662	
EASE2		0.837	
EASE3		0.669	
EASE4		0.750	
INCH1			0.685
INCH2			0.765
INCH3			0.775
INCH4			0.645
% of Variance	22.756	21.511	19.935
Cumulative %	22.756	44.267	64.202

Table 4. Factor Analysis Results

Multiple Regression Analysis

Multiple regression analysis was used to investigate the relationships between independent variables and dependent variable. Student characteristics variables were treated as dummy variables. Tolerance and Variance Inflation Factor (VIF) were applied to diagnose collinearity. O'Brien (2007) suggests that a tolerance value less than 0.2 or 0.1 and VIF value excess than 10 indicate a multicollinearity problem. All factors conform to a common rule of thumb. All factors have tolerance values greater than 0.4 and more than half have tolerance values greater than 0.8. In addition, VIFs of all factors are less than 2.1. These results reveal no multicollinearity problems. The result of multiple regressions is depicted in Table 5. Four of eight hypotheses are significant at P value 0.00 (hypotheses with asterisks). This result identifies that there are positively significant relationships between perceived usefulness, perceived ease of use, and instructor characteristics. Also, there are positively significant relationship between intention to use/ use and net benefits. The squared multiple correlation coefficient, R^2 , was 77.6 percent which means the adoption factors could accounted for 77.6 percent in Facebook adoption as a computer-mediated communication for TBS students. Based on Table 5, the most important Facebook adoption factors are perceived usefulness ($b = 0.529$, $p = 0.000$), perceived ease of use ($b = 0.429$, $p = 0.000$), and instructor characteristics ($b = 0.251$, $p = 0.000$) respectively.

Hypothesis	Variable	Beta	Sig.	Result
H1*	Perceived Usefulness	0.529	0.000	Accepted
H2*	Perceived Ease of Use	0.429	0.000	Accepted
H3*	Instructor Characteristics	0.251	0.000	Accepted
H4	Student Characteristics (Dependent)	-0.033	0.550	Rejected
H5	Student Characteristics (Collaborative)	0.087	0.084	Rejected

H6	Student Characteristics (Independent)	0.016	0.733	Rejected
H7	Past Behavior	-0.046	0.466	Rejected
H8*	Intention to Use/ Use	0.680	0.000	Accepted

Table 5. Multiple Regression Analysis Results

DISCUSSIONS

Results of this study confirm TAM model in the aspects of perceived usefulness and perceived ease of use' important and support DeLone and McLean's model in term of the net benefits consideration. *Perceived usefulness* is the most influential factor which can be described that many students access the course Facebook pages to acquire shared resources, both from their instructor and classmates. Moreover, they access the course Facebook pages to greet classmates and the instructor in special occasions, to ask for solutions of assignments or homework, or to express comments or feelings that they too shy to say or ask in the classroom. Secondly influential factor is *perceived ease of use*. Since participant students have unequal computer skills and come from various fields, not all from the management information systems department, the ease of use of Facebook interface is still important for accepting the course Facebook pages. Some students said that they do not have their own Facebook pages and use the Facebook application only for accessing the course Facebook pages. Thus, easiness of Facebook usage is vital for the students who are not familiar with the Facebook. *Instructor characteristics* are the last influential factor for the course Facebook pages' adoption. Although instructor factor has less involvement than other factors, instructors have a key role in selecting media in teaching, expressing benefits expected to received from applying the media, and encouraging students to use those media effectively and efficiently. Instructor characteristics, in terms of stimulating students' participation, paying attention to students, concentrating on teaching, and promoting group interactions, are necessary to boost the novel media usage.

Two factors were rejected to be antecedents of the adoption of the course Facebook pages. *Learning styles* of students are rejected conforming to prior study which specifies that there are no statistical evidence accepting relationships between either the learning preferences or type and the success in an online or face-to-face course (Neuhauser, 2002). Hunt et al. (2002) also confirm that there are no correlations between collaborative style, dependent learning, independent learning and technology-based modes. The technology-based modes contain wide range of technologies including email, videoconferencing, or web-based courses. In addition, this can be explained that because activities in the course Facebook pages cannot clearly focusing on any particular groups; for example, emphasizing on resource sharing to support dependent learners, highlighting on student interactions to support collaborative learners, or focusing on implementation of students' ideas to support independent learners, three student characteristics are not supported to be the course Facebook acceptance driver. *Past behavior* is also rejected. The result is consistent with Ouellette and Wood (1998) that past behavior is a weaker predictor of future behavior in the domains that present unstable contexts. Stable context domain is the domain which activities are present regularly such as on a daily or weekly basis. However, activities in the course Facebook pages are various according to different needs and objectives of each subject, each instructor, or each classroom, so the contexts in the course Facebook pages are quite unstable.

GUIDANCE FOR INSTRUCTORS

In summation, to successfully apply Facebook in classroom, instructors should firstly emphasize both direct benefit of acquiring resources and indirect benefit of connecting classmates and instructors easily which would be gained by the social tool adoption. Secondly, SNSs with friendly user-interface design should be selected. Facebook is strongly suggested due to its popularity among youths, its ease of use, and its faster development of new features. Lastly, instructors should provide more resources that are voice clips of teaching, examples of finished cases, teaching slides, lecture notes, etc. on the course Facebook pages to make the perceived benefits become real. They should also build more participation of students in the course Facebook pages, especially the participation from shy students who involve less in class. Since Mediapro (2006) states that passive retrieval of information is more popular internet-based activity among young people than content creation, instructors should encourage students to create more contents in terms of showing their opinions, sharing knowledge, exchanging ideas for solving some assigned topics, etc. Because Wall and discussion boards are popular features from the students' viewpoints, instructors can also take advantages of Wall to build good teacher-student relationships/ student-student relationships, to provide easy noticed information, or to provide short answers. Discussion boards or notes can be helpful in giving assignments or homework or extensively explaining some information to students and expecting their feedback. Other Facebook services are also interesting to apply more and more such as using photos or videos to present past class activities, pasting links to guide students to read more useful information, creating events to show the class activities' time table, etc.

However, all provided resources should be up-to-date and all inquiries from students should be responded quickly as soon as possible to make the course Facebook pages always active and to show that the instructors pay attention to them.

CONCLUSION AND FUTURE RESEARCH

Beside adoption of social networks for entertainment, social, and marketing, social networks are accepted to be the interesting mean for education. Social networks have several benefits for universities in terms of their rationality and cost-effectiveness. In a classroom, social networks can be a viable mean for communication and resource sharing. Therefore, this paper studies the adoption of social networks as computer-mediated channel using Facebook as a case study. The factors are mainly gathered from TAM and D&M models. Literature reviews for instructor characteristics, student characteristics, and past behavior/ experience are also explore to investigate additional factors in terms of the course Facebook pages' participants. Quantitative surveys are used to prove their relevance to intention to access the course Facebook pages and to confirm influence of intention to use/ use on net benefits perceived by students. Three of seven factors, from two viewpoints, perception and instructor, are accepted to be Facebook adoption drives. Because Facebook was firstly developed to serve university students and are still used by many university students. This result can be applied both by Facebook developers in adding more services to support education and by instructors who employ Facebook or other social network systems in their classes. This research discusses the result based on the course Facebook pages adoption in a specific time and environment only, so further research should be carried in different environments or other countries to compare the results. More factors about instructors and students such as teaching styles, introvert and extravert dimensions, etc. should be investigated to deeply comprehend the importance of instructor characteristics and student characteristics in the novel means' adoption as well.

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