

*Full Length Research Paper*

# Impact factors model of internet adoption and use: Taking the college students as an example

Fan-Bin Zeng

School of Journalism and Communication, Jinan University, GuangZhou, 510632, China. E-mail:  
zengfanbin@vip.sina.com. Tel: 86 13760787115.

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**The goal of this study was to explore the impacts of factors model of internet adoption, along with discussing the impact of the variables on internet adoption time, internet use time and internet use related to study and work. This study comes up with the hypothesis based on the theoretical frameworks of diffusion of innovation, uses and gratifications, technology acceptance model. Through taking Jinan University's students as sample (N = 302), the article revealed that socio-economic status significantly influences the time of internet adoption and use. The adoption time of the internet significantly influences the time of internet use. However, the adoption and time usage of the internet do not significantly influence the internet use related to study and work, as it is significantly affected by the college students' perception about the usability and ease of use of the internet.**

**Key words:** The adoption of the Internet; internet use; innovation diffusion; uses and gratification; technology acceptance model.

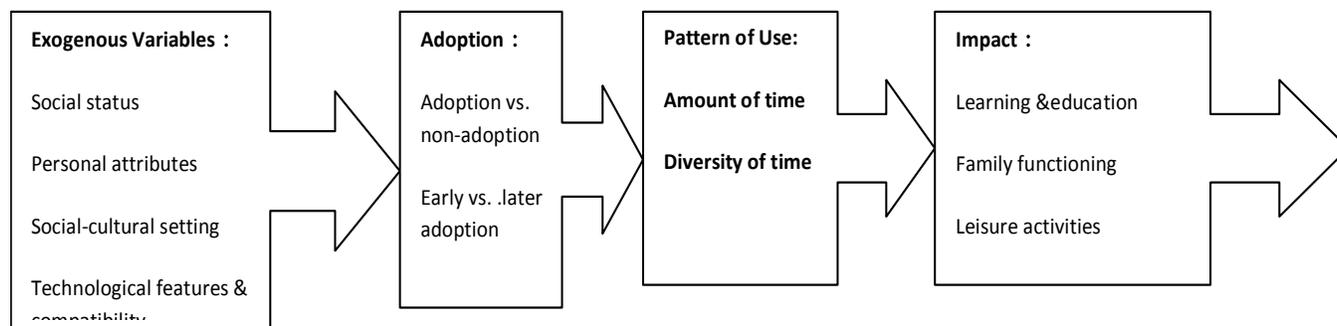
## INTRODUCTION

According to the 27<sup>th</sup> statistical reports of China's internet development published by China internet network information center on January 19, 2011, the scale of internet users has rapidly exceeded 450 million to reach 457 million by the end of December 2010, with an increase of 73.3 million. The internet access rates have raised to 34.3%, 5.4% increase as compared with 2009. The increase of internet access rates reflects the elevated access and adoption of the internet in China. The government and researchers have been concerned about the access and adoption of the internet since this increase, such that America reported "Falling Though the Net" in the National Telecommunications and Information Administration (NTIA, 2001) in 1995, 1998, 1999 and 2000. The reports illustrate the rapid increase of population who utilizes the internet. Reports also depicts that young, high educated and high-income population will gradually obtain higher income and better employment opportunities through the use of internet. On the other hand, the aged and the lower income segment will face a more difficult life without the use of internet. The relevant research displays the impact factors of the internet's adoption between countries, including the

economic development, knowledge, opening up and communication technology import level. While the internal impact factors include the economic growth, urbanization level and information technologies application on levels; these studies offer a widespread development of theoretic and empirical evidence of this particular topic.

As the internet grows stronger, researchers change their angle from original study to the time, mode and purpose of internet use. For instance, some researchers analyzed the age difference between different users; the conclusion was that the younger population is likely to use the internet as the tool of communication and interaction as compared with the older generation. Whereas, some researchers argued that people in a higher socio-economic status use the internet more frequently as a recreational tool as well as in advanced vehicles to access information as compared with those of lower socio-economic status. These studies reflect that different people have different ways of usages of the internet even if they have the same internet adoption.

However, the comprehensive understanding about the impact of the internet on different people has not been obtained through the studies of the adoption and use of



**Figure 1.** A chain process model of the adoption, use, and social impacts of home computing

the internet respectively. People would use the internet only after they have adopted it, while the same level of internet adoption does not mean the same level of internet use. Therefore, a study of the adoption of the internet combined with the use of it should be undertaken.

Researchers from other countries have conducted similar researches. For example, Kyung (2004) found that, factor such as socioeconomic status, attitude towards the internet and social support (especially family support) have a significant impact on the internet access of population through the data from South Korea. Such research also noted the ways of internet use in South Korean, such as using search engines, playing on-line games, communicating with others, shopping online, as well as social networking. However, results from other countries' research should not be applied or assumed to the ways people use the internet in China. In order to comprehend the impact of the internet on Chinese, a study of the influencing factors of internet adoption and their relationship should be undertaken. However, the empirical research on the adoption and the use of the internet in China was relatively vague, particularly on the model's establishment of the influencing factors of adoption and use of the internet. This particular report illustrates the research that has been undertaken to attempt to comprehend the influencing factors of adoption and use of the internet through empirical methods and the possibility of proposing a complete model by selecting the college students as example. The reason of using college students as the sample population is that, relevant research shows the rate for college students' users was 97.5% in 2007; seven times of the rate (12.3%) of its overall internet users which shows that the college students are the main adopters and users of the Internet. More importantly, as most college students will be working in the future, the use and impact of Internet on them will directly affect the social development in the long term. Hence they will be selected as the object in this particular study.

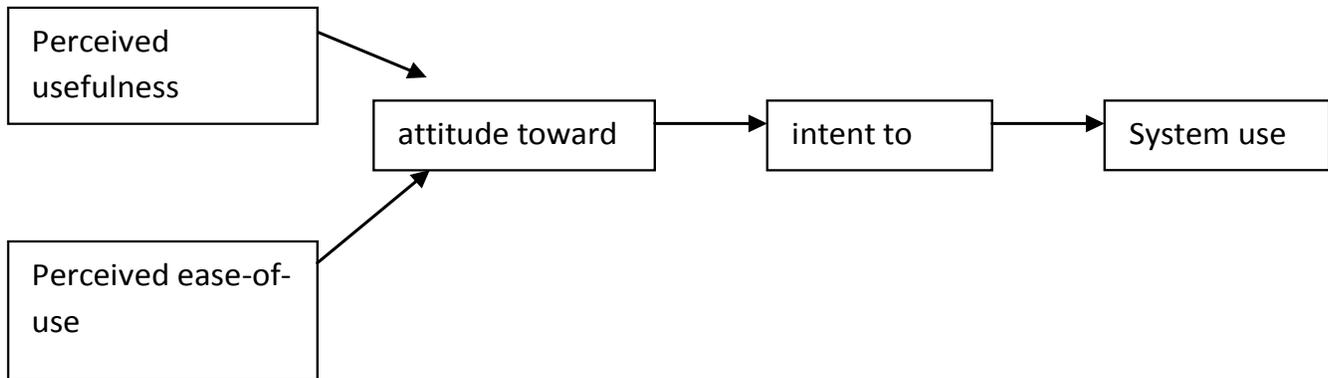
From the aforementioned analysis, there are two aspects of meaning to this study: (a) Theoretically

organized models to describe the relationship between adoption and use of the internet (including the time and the purpose); (b) The major influencing factors between internet adoption and use found by the empirical data which can be used to improve the adoption and use of the internet, especially for college students as it is important and practically helpful to facilitate the appropriate use of the internet.

## THEORETICAL MODEL AND HYPOTHESIS

Most noticeably, diffusion of innovation was done by Rogers (1995), while uses and gratifications were done by Rubin (1994). Dutton et al. (1987) explicitly underscores the causal links among diffusion, use and social impact of home computing and thus integrates these processes into a unified framework. Figure 1 (Appendix A) summarizes the exogenous, intervening and dependent variables proposed by Dutton et al. (1987).

Home computing involves a three-stage process: individual socioeconomic and demographic characteristics, perceptions and attitudes towards the internet, socio-cultural setting, and hardware and software features serve. These independent variables have a direct impact on: (a) the adoption of home computers, which in turn determines; (b) the use of home computing, which in turn affects; (c) a wide range of perceptions and behavior including learning and education, family functioning, leisure activities, work from home, household routines, privacy, civil liberties, and property rights. The 11 survey-based investigations reviewed by Dutton et al. (1987) have provided supporting evidence, in varying degrees, for some portions of the model. They have depicted that social economic status as well as, formal education create a remarkable influence on home computers, and that capabilities growth is higher than its entertainments features' growth. This chain process model is substantial for the model on the predictors of the adoption and use of the internet as both the internet and home computers are



**Figure 2.** The model of technology acceptance model.

related as an “instrumental tool” (For example; for work, word processing, education and home budgeting). However, this model is incomplete and inadequate, as the relations between adoptions with use of home computing and the impact of this model lacks a detailed statistical data. Although, home computers have predictors on the internet adoption and use, it cannot be used directly. Therefore, the model of the adoption and use of the internet should be created.

With regards to the internet adoption and use, researchers employ innovation diffusion theory, uses and gratifications as main frameworks. A study conducted by Rogers (1995), demonstrates that the diffusion theory addresses the characteristics of innovations and their adopters (Rogers, 1995). According to Rogers (1995: 11, 22) “an innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption.” He also defines “innovativeness” as “the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than the other members of a system”. This diffusion theory suggests that adoption of technological innovations is a function of one’s innovativeness, or willingness to try new products (Atkin et al., 1998; Neuendorf et al., 1998; Rogers, 1995). Roger’s (1995) research has focused on the socio-economic characteristics of an individual, the perceived attributes of innovations, technology cluster, situational factors, as well as, the characteristics of the innovations which influenced adoption which has allowed him to comprehend the potential predictors of adopters in innovation. Zhu (2004) has further emphasized this particular study by developing a new construct of needs for new media technology, called “Weighted and Calculated Needs for New Media (WCN)”. This allowed the research to fill a gap in the literature on diffusion and uses and gratifications. WCN not only integrates two mentioned theory but also elaborate mechanisms underlying the adoption and use of new media: contrasting between the conventional and new media, and the weighting among different needs. As such, WCN

predicts that individuals continuously adopt and use a different medium when the conventional media cannot satisfy their specific needs. For instance, social network websites are used in order to satisfy the needs of communication. Take the internet, for example, only when people feel the conventional media can’t satisfy certain needs like, expressing personal advice or meeting some friends and the internet is able to satisfy this need that they will use the internet. Based on this, this study uses WCN to balance people’s use and need of the internet.

Technology Acceptance Model (TAM) has been used to further explore impact factors as some researchers believed the innovation diffusion theory and uses and gratifications contains lack of support in the relations of internet adoption and use. The Technology Acceptance Model (TAM) was developed to address this key problem surrounding the field of information technology. The primary objective was to assess why performance gains were often inhibited or obstructed by a user’s unwillingness to accept new technology. It has stated that “Because of the persistence and importance of this problem, explaining user acceptance has been a long-standing issue in MIS research” (Davis, 1989: 319). The Technology Acceptance Model (TAM) was an adaptation to the Theory of Reasoned Action (TRA) developed by Fishbein and Ajzen in 1980. TRA was an original theory in the sense that the researchers hypothesized that a person’s intention to perform a behavior (BI) was influenced by a person’s attitude (A) and subjective norm (SN)  $BI = A + SN$ .

The Technology Acceptance Model (TAM) is the information systems theory that illustrates how users accept and adopt a technology (Figure 2). The model suggests that a number of factors influence their decision about how and when they will use it, when presented with a new technology, notably including the following:

1. Perceived usefulness (PU) - This was defined by Fred Davis as “the degree to which a person believes that

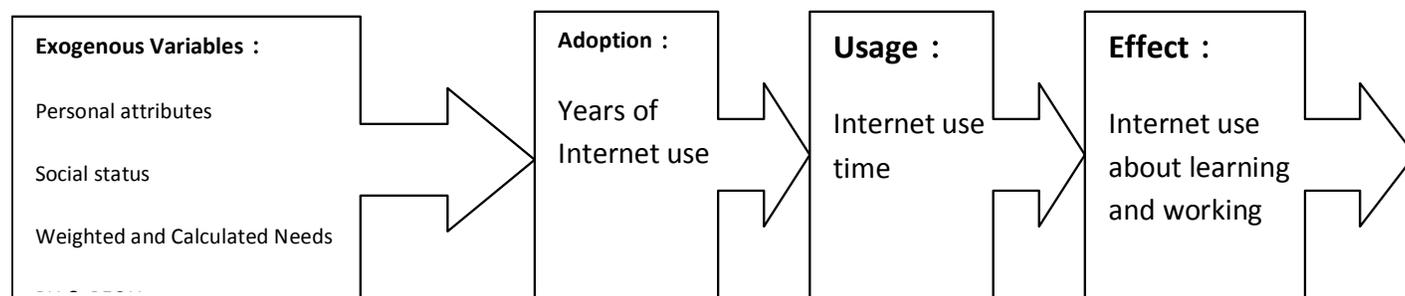


Figure 3. A model on the predictors of the adoption and use of the internet.

Table 1. Demographic characteristics of sample.

Variable	Demographic Characteristics of sample
Gender	111 Male (36.8%), Female 191 (63.2%)
Age	20 years old and less (29, 9.7%); 21-22 (115, 38.1%), 23-24 (125, 41.4%), 25 years old and beyond (33, 10.9%); Average age: 23
Educational level	Freshman and sophomore (29, 9.7%), juniors and beyond (131, 43.4%), graduate students and beyond (142, 47%)
Political position	Communist (105, 34.8%), Democratic staff (3, 0.99%), Communist Youth League (91, 30.1%), Mass (103, 34.1%)
Enrollment status	Enrollment in mainland China (199, 65.9%), Hong Kong's enrollment (66, 21.9%), Macao's enrollment (26, 8.7%), Taiwan's enrollment (5, 1.7%), other regional enrollment (6, 1.99%)

using a particular system would enhance his or her job performance".

2. Perceived ease-of-use (PEOU) - Davis defined this as "the degree to which a person believes that using a particular system would be free from effort" (Davis 1989).

TAM postulates that compute usage is determined by BI, and BI is determined by the person's attitude toward using the system, and PV, and the attitude is determined by PV and PEOU.

According to the aforementioned theory, this study attempt to test Figure 3, after adjusting the variable of Figure 1.

Research depicts that internet usage by college students are essentially, for education and work. However, it does not illustrate other activities of students' internet usage. According to Figure 3, this study tries to answer the following questions and testing the following hypothesis:

RQ1: How the variable of Personal attributes, Social status, Weighted and Calculated Needs, Perceived usefulness (PU), Perceived ease-of-use (PEOU) predict the Years of internet use, internet use time and internet use about learning and working.

H<sub>1</sub>: The more years of internet use, the longer internet use time of college students is.

H<sub>2</sub>: The more years of internet use, the more internet use about learning and working of college students is.

H<sub>3</sub>: The more internet use time, the more internet use about learning and working of college students is.

## METHODOLOGY

### Sample

This survey was conducted in Jinan universities in Guangzhou in the month of May, 2010. A total of 335 respondents completed the questionnaires and 302 questionnaires were valid, therefore, the survey completion rate was 90.1%. Demographic Characteristics of sample was shown in Table 1.

Inevitably, the key demographic variables of this convenience sample are valid (All the data in this study can be obtained from researchers after authorization). Meanwhile, the data show that the minimum of the average online time is one hour, while the minimum internet age is one year. When combined with the popularity of the university internet, it can be drawn from the sample of these students who have no difference in accessing the internet that it is unnecessary to analyze whether or not they adopted the internet.

### Dependent variable

1. Years of internet adoption: Measurement question is that "How long are you online until now?" Years of internet use is a continuous variable.

2. Internet use time: Measurement question is that "How much average time do you spend online per day?" Internet use time is a continuous variable.

3. Internet use about learning and working: According to the research needs, the conduct of internet use was focused to obtain knowledge about learning or working. Therefore, this article uses the following questions measure: As following actions, the frequency is (1 = never use, 2 = rarely used, 3 = sometimes used, 4 = more frequently used, 5 = often used). A, use e-mail to learn and study work-related information; B, participate in online, discussion and learning things about life; C, through a search engine on the internet for research purposes in learn living-related information; D, visit relevant website, BBS that published professional knowledge and related to learning and living; E, to use blog for posting articles about study and life. For this purpose, internet access will directly change into online behavior and learning, life, the extent of knowledge related to measurement. All items will add up to a subsidiary of another branch dependent variable, work-related internet use index which also belongs to a continuous variable.

### Independent variable

#### Social status

(1) Parents' level of education: Past research has shown that parents' level of education affects the acquisition of cultural knowledge of young population (Feng, 2005). In order to further explore the influence of parents' level of education on young population's internet skills, different categories have been created: any college that is above the standard level of education is used as a standard; if the father or mother received any college and higher level education = 1; and if the father or mother did not receive any college education = 0.

(2) Living expenses per months: This represents the ability of consumption per months, and on behalf of the income of their household. It is a continuous variable and recorded according to the actual figure.

(3) Birthplace: As the internet usage between city and non-urban becomes different, we set urban = 1, sub-urban and rural = 0 for the assignment.

(4) Educational level: We set undergraduate=0, graduate students and beyond=1.

#### Weighted and calculated needs

According to the measurement by Zhu (2004), this study measures the variables of college students needs: need for news, need for personal information, need for work/study information, need for entertainment, need for expression, and need for relationship. In view of these needs, measurement questions are: (a) how much the conventional media have satisfied these needs, (b) how much the internet may satisfy these needs, and (c) how important each of the needs is. The respondents answered the first two questions on a 5-point scale and the last question by ranking the importance of the six needs (6 is the most important). A composite score for each dimension was then calculated by multiplying the difference between questions 1 and 2 by question 3. For example, if a person considers his or her need for news, ranked as the most important (6), is totally unsatisfied by the old media (1) but could be fully met by the internet (5), then the person will have a score of  $24 = [(5 - 1) \times 6]$  on need for news from the internet.

### Perceived usefulness (PU) and Perceived ease-of-use (PEOU)

(1) The concept of Perceived usefulness is regarded as the perception of the object which is helpful to the living: This study adopts six items to measure the degree of advantage of the internet which is helpful to the living. The respondent is required to state clearly their attitude towards the six statements in the Likert Scales, which 1 means "totally disagree", 5 means "totally agree". The six statements is as highlighted thus: A); using internet can assist in the completion rate of a task; B); Using the internet can improve work (learning) performance; C); using the internet can strengthen my work (learning) ability; D); using the internet can improve my work (learning) efficiency, E); The internet allows things to be achieved easier, F); The internet is useful in my daily life. The measurement of perceived usefulness is summed up by the figure of six statements.

(2) The concept of perceived ease-of-use is the attitude toward the particular system is easy to learn and use by users: This study adopts six items to measure the internet which is helpful to the living and request the respondent to state clearly that the attitude toward six statements in 5-Likert Scales, which 1 means "totally disagree", 5 means "totally agree". The six statements is as presented thus: A); Learning how to use the internet is an easy thing for me, B); Doing the things what I want through the internet to is much easier, C); I understand how to use Internet, D); In my opinion, the use of network system process is very flexible, E); Grasping the skill of using the internet is not a difficult task to me F); I think the internet is easy to use. The measurement of perceived ease-of-use is summed up by the Figure of 6 statements.

(3) Personal attributes: Here, we have two variables: gender (Male = 1 and female = 0) and age (continuous variable).

## RESULTS

In this study, as the three dependent variables are all continuous variables, independent variable is category variables (dummy variables) or continuous variables; multiple linear regression analysis of the three dependent variables has been used respectively. Years of internet use is the independent variable, while the dependent variables are internet use times and the use of internet in the learning and working model. This can be seen in Table 2.

### Answer to RQ1

Model 1 shows that the age variable, the living expenses per months, the place of birth variable, perceived ease-of-use are significant predictors to the years of internet use, while the Betas of all independent variable are positive ( $B > 0$ ). It shows that the college students with older, more living expenses per months, bore in urban areas are using more years of internet use than those who are not. Among these factors, age is an advantage for older students than younger students, while the conclusion which states that living expenses per months and place of birth are positive predictors to the years of internet use is the same as that of previous studies. The variables of gender, father education, mother education, educational level have no influence on the variable of the

**Table 2.** Multiple linear regression analysis of the three dependent variables.

		Years of internet use (model 1)		Internet use time per day (model 2)		Internet use about learning and working (model 3)	
		B	SE	B	SE	B	SE
constant		-4.249	2.072	0.510	2.500	12.326***	2.799
Personal attribute	Gender	-0.432	0.282	-0.089	0.339	-1.223**	0.380
	Age	0.31**	0.087	0.082	0.107	-0.048	0.120
Social status	Father education	0.263	0.354	-0.075	0.425	-0.676	0.476
	Mother education	0.142	0.398	-0.094	0.477	0.914	0.534
	living expenses per months	0.001***	0.000	0.001***	0.000	0.000	0.000
	Place of birth	1.306***	0.326	1.186***	0.401	-0.682	0.456
	Educational level	0.481	0.374	-1.257**	0.449	0.986	0.509
Weighted and calculated needs	The index of Weighted and Calculated Needs	-0.003	0.008	0.006	0.010	0.011	0.011
PU and PEOU	Perceived usefulness	-0.019	0.034	0.002	0.041	0.180***	0.046
	Perceived ease-of-use	0.124**	0.037	0.035	0.045	0.176**	0.050
Years of internet use				0.142*	0.070	0.039	0.079
Internet use time per day						0.036	0.066
R <sup>2</sup>		0.269		0.278		0.256	
ADJUSTED R <sup>2</sup>		0.244		0.251		0.225	
N		302		302		302	

\*p<0.05;\*\*p<0.01;\*\*\*p<.001.

years of internet use. The educational level has no influence as the social status of college students does not correlate with the education level nowadays.

Model 2 shows that the living expenses per months, the place of birth, the educational level are significant predictors to internet use time per day, while the Betas of living expenses per

months, the place of birth are positive (B>0). It shows that college students with more living expenses per month, bore in urban areas are using internet use time per day more than those

**Table 3.** The statistical values of weighted and calculated needs of 6 items.

Variable	The news	Information about personal living	Information about working	Entertainment	Express personal opinion	Personal relation
Mean	0.75	1.57	1.50	1.95	3.34	2.39
Standard deviation	3.26	3.64	3.01	4.66	6.56	4.83
Maximum value	-18	-12	-8	-15	-24	-15
Minimum value	24	18	16	24	24	24

who are not. The Beta of education level which is negative ( $B < 0$ ) shows that the undergraduate college students are using more internet use time per day than graduate students.

Model 3 shows that gender, place of birth, education level, the internet's perception of the usefulness and usability are significant predictors to internet use about learning and working. The Beta of gender is negative ( $B < 0$ ), suggests that the number of male students who use internet for learning and working are higher than female students., The Beta of the internet's perception which shows that the usefulness and usability of the internet is positive ( $B > 0$ ) suggests that college students with more perception of usefulness and usability use internet more for learning and working than those who are not. Compared to model 1 and model 2, the internet's perception of the usefulness and usability play an important role on internet use about learning and working other than the years of internet use and internet usage time per day.

### Hypothesis testing

According to Model 2, years of internet use has significant influence ( $B = 0.142$ ,  $p < 0.05$ ) on internet use time per day, and the regression coefficients are positive, therefore, hypothesis 1 is tested, which suggests that the more years of internet use, the longer internet use time per day is. While according to model 3, the variables of years of internet use, internet use time per day have no significant influence on internet use about learning and working. Therefore hypothesis 2 and hypothesis 3 are not tested.

### A model on the predictors of the adoption and use of the internet after compositing the questions and hypothesis

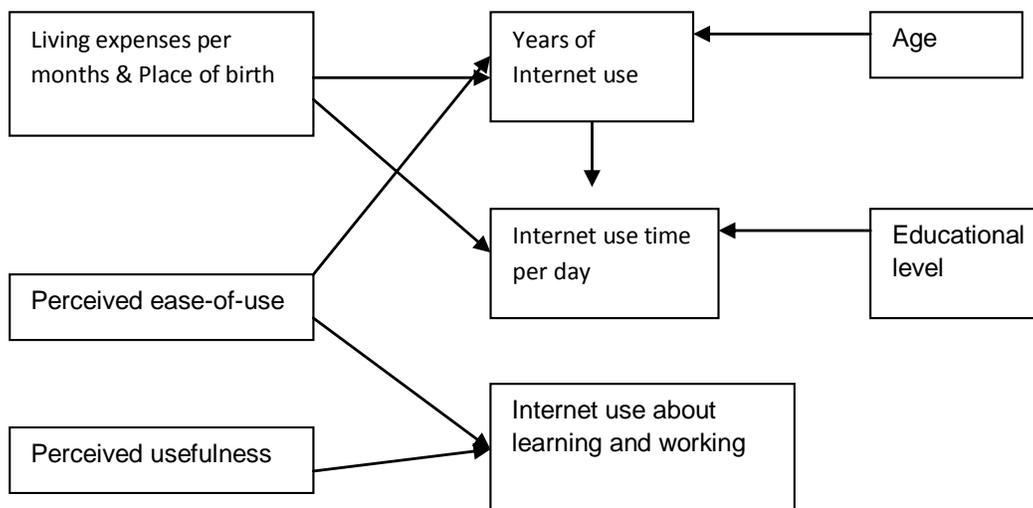
Figure 4 model shows that in general, social economic status variables have significant influence on the years of internet use, while the years of internet use is a significant predictor to internet use time per day. Therefore, the variable of social economic status, the

years of internet use, internet use time per day compose a chain predicting model. However, the internet use about learning and working does not correlate with years of internet use and internet use time per day as it correlates with the variable of the internet's perception of the usefulness and usability, which suggests that if there is an increase in internet use about learning and working, the cognition of internet among college excluding the difficulty of internet using by college students should also be increased.

### DISCUSSION

This study proposes a variable of weighted and calculated needs from Figure 3 model; however, it does not significantly have influence on the three dependent variables, which are not consistent with previous researches (Zhou, 2004, 2008). In order to discuss this problem, the comprehensive values of weighted and calculated needs are divided with the following results in Table 3. According to the analysis of Table 3, the average of six demand values is concluded as positive which depicts that the attitude of internet use by college students is positive. Among these values, the opinion expression demand value is highest, followed by the interpersonal relationship needs, recreational needs, personal information needs, working information and news information needs. This indicates among the university student group, the most important is opinion expression but not for working and learning information. Therefore, when the dependent variable is based on internet use for learning and working, the variable of weighted and calculated needs will have no influence. From the above findings and discussions, it has been concluded that the following kinds of countermeasures to improve internet adoption and use of students include:

(1) To reduce the cost of using the internet: According to the aforementioned research, socio-economic status has a positive impact on the time of internet adoption and use. The reason is probably due to the high expense of using the internet and the embarrassment the students in lower socioeconomic status faced by wanting to make better use of the internet. To provide free or low-price



**Figure 4.** A model on the predictors of the adoption and use of the internet after adjusted.

computer products, it's conducive for students to overcome the economic costs while enhancing the efficiency of Internet.

(2) To provide the education of using Internet effectively, it involves two aspects: Firstly, educating the students' on the knowledge of the internet use, such as searching for study materials, identifying misconduct uses of internet and harmful information. In addition, necessary hardware and software knowledge should also be taught to students to enhance the facility of the internet; Secondly, increase in students' confidence and positive attitudes on using the internet. As there have been reports on students' inappropriate use of the internet from the media, it has been difficult to cultivate students' confidence and positive attitudes towards the aspects of the internet. Therefore, the university should provide relevant courses and seminars to overcome this difficulty while enhancing the facility of the internet for the students. According to the conclusion of this study, enhancing internet facility for the students will promote the use of the internet for study or work purposes. On the other hand, educating students will allow them to slowly adopt the appropriate use of the internet.

(3) The internet has become an essential tool for students to get relevant information for work and study as well as, an efficient communication for social interactions. Therefore, it will provide effective resources for both teachers and students while achieving a solid basis in building socialist in the current society as the aspects of the internet grows stronger.

Inevitably, this research contains some limitation, including the sample not being selected randomly. Therefore, the sample was able to test the hypothesis but could not be deducted as a whole. In order to overcome this limitation, future research should adopt an enhanced random sample while acquiring a relatively larger sample to increase reliability and validity of the research results.

## REFERENCES

- Ajzen I, Fishbein M (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs NJ: Prentice-hall, pp. 4-8.
- Atkin D, Jeffres L, Neuendorf K (1998). Understanding Internet adoption as telecommunications behavior. *J. Broadcast. Elect. Media*, 42(4): 475-490. DOI:10.1080/08838159809364463
- China Internet Network Information Center (2011). the 27th statistical reports of China's Internet Development (Jan.2011) [[DB/OL].<http://www.cnnic.net.cn/dtygg/dtgg/201101/P020110119328960192287.pdf>.(in Chinese)
- Davis F (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarte*, 1989, 13(3): 319-341. DOI: 10.2307/249008
- Dutton WH, Rogers EM, Jun SH (1987). Diffusion and social impacts of personal computers. *Communication Research*, 14: 219-250. doi: 10.1177/009365087014002005
- Feng XFC (2005). Education availability and class differences: an empirical research of education distribution(in Chinese), *Tsinghua university education study*, 5: 22-30.
- Kyung YR (2004). The Adoption and Use of the Internet in South Korea, *JCMC* 9(4) July 2004 DOI: 10.1111/j.1083-6101.2004.tb00299.x
- National Telecommunications and Information Administration (2001). *Falling Through the Net*[[DB/OL].retrieve from <http://www.ntia.doc.gov/>.
- Neuendorf KA, Atkin DJ, Jeffres LW (1998). Understanding adopters of audio information innovations. *J. Broadcast. Elect. Media*, 42: 80-93
- Rogers EM (1995). *Diffusion of innovations*, 4th edition. New York: Free Press.
- Rubin, Alan M. (1994), *Media Uses and Effects: A Uses-and-Gratifications Perspective*, in *Media Effects: Advances in Theory and Research*, Jennings Bryant and Dolf Zillmann, eds., Hillsdale, NJ: Lawrence Erlbaum Associates.
- Zhou B-H (2008). Information and Expression in Web 2.0: A Study of Internet Users in Shanghai, *Journalism and communication research* (in Chinese), 15(4): 76-82
- Zhu J (2004). Competition between Alternative Sources and Alternative Priorities: A Theory of Weighted and Calculated Needs for New Media(in Chinese), *China Media Reports*, 2004, p. 2.