College Students Perception of the Second-Level

Digital Divide: An Empirical Analysis

Fanbin Zeng

College of Journalism and Communication, Jinan University

Guangzhou 510632, China

E-mail: zengfanbin@vip.sina.com

Abstract

The goal of this study was to take a comprehensive measure to the second-level digital divide, along with analyzing the various factors, and finding out the prominent factors. This study comes up with the hypothesis based on three Theoretical framework of Knowledge gap theory, Use and gratifications theory, Self-efficacy and attitude theory. Based on a survey on students of Jinan University (N=302), Multiple linear regression shows that the sensibility factors of Internet use, including the attitude toward the Internet and the Internet self-efficacy, have significant positive effects on the level of Internet use, including the time of Internet use and the index of Internet use about studying and working.

1. Introduction

Digital divide can be divided to two kinds: The first Internet access on the digital divide refers to the gap, known as "accessing divide"; the second-level digital divide exists between the Internet uses, known as "using divides". Early researches focused on the digital divide in the "accessing divide". With the increase in the penetration rate of Internet access, digital divide research has begun to transfer from the first gap to the second gap.

For the second-level digital divide, the study in western country mainly focuses on the following aspects: (1) the socio-demographic factors of Internet use. For example, Fox and Madden (2005) found that young people tend to use more communication and interaction tools compared with other age groups based on the analysis of age between different Internet users. Based on the analysis of socio-economic status, Madden and Van Dijk (2005) found that people in high-level socio-economic status use more advanced Internet tools in order to achieve access to information, continuous learning and self-service purposes. However, the population in the lower socio-economic status tends to use the Internet as a tool for entertainment and chat (Madden, 2003; Van Dijk, 2005). Compared with other populations, Madden and Rainie (2003) found that minorities or colored population are lacking behind in the use of e-mail, access to political and health information, online shopping and so on, but leading in download music, online games and access to information on sports based on the analysis of race of nation. However, different racial and ethnic gap between the use of the Internet in undergraduate groups is very small (Jaskson, 2 001;Cotton & Jelenewicz, 2006). Joy Peluchette, Katherine Karl (2008) examined students' use of and attitudes toward social networking sites. Significant gender differences were found regarding the type of information posted and whether students were comfortable with employers seeing this information. Steve Jones (2009) presents a complex picture of differential Internet use along gender lines, one that is generally consistent with the existing scholarly literature. Differential use based on race is a bit more complex. Stronger points of contrast emerge amongst White non-Hispanic, Hispanic, and Black non-Hispanic college students than they do when the respondents are grouped by gender. (2)Psychological factors of Internet use. Hamburger (2000) concluded that outward-looking men prefer to use the Internet for leisure activities, but nervous women are more like using social networking services. However, some studies found that personal factors as Internet use have little effect (Hills, & Argyle, 2003). In the self-confidence, the studies have pointed out that the self-confidence in Internet use among adolescents (13-18 years old) especially in male adolescents is very important (Broos & Roe, 2006). Other studies pointed out that compared with age, gender and skills, self-confidence has a weaker

influence (Livingstone & Helsper, 2007). (3)Analyzing the social network of Internet use, Rojas (2003) found that the negative attitudes of relatives and friends of using the Internet play a negative role in poor families and young people of Spain. (4) Analyzing the skills factors of Internet use, most studies have shown that Internet age and the network frequency are important factors to affect using the Internet functions according to the analysis of the experience, (Peter&Valkenburg, 2006; Hargittai & Hinnant, 2008).

In China, the study on the second-level digital divide mainly focus on the following aspects: (1) Using indicators to measure. By examining eight operation abilities of Internet user, Zhu Jianhua (2001) reflected their overall Internet use skills. (2) Analyzing its influencing factors, for example, Wei Lu (2008) pointed out that network knowledge had a prominent influence to the Internet use intention (Wei Lu, 2008). (3) About the social influence of second-level digital divide, Wei Lu (2006) pointed out that compared with Internet access, Internet use for people has a greater influence on knowledge acquisition.

In all, the western studies on the second-level digital divide have advanced the past socio-demographic situation, economic conditions and other factors, extending to various factors. However, Internet adoption and use between foreign and Chinese situation are very different, it can not be directly applied to China.

The deficiencies of research about second-level digital divide in China exist in the following areas:

First, lack of detailed operational definition and measurement. Though the measurement of the first digital divide has outcome, it can not be directly applied to the second-level digital divide. At the same time, some studies have measured the certain Internet skills, but without a comprehensive measure.

Second, lack of empirical studies. There are not experience evidence in past theoretical research articles, especially lack of questionnaires, interview surveys to gather first-hand data in Chinese researches.

Therefore, the purpose of this study seeks to make up for the shortcomings of past research, select college students as an example for the empirical analysis, take a comprehensive measure to the situation of the second-level digital divide, along with analyzing the various factors, and finding out the prominent factors.

2. Theoretical framework and Hypotheses

2.1 Knowledge gap

According to the theory of "knowledge gap" in 1970, P.J.Tichenor found that mass communication might actually expand the knowledge gap among members of different social status. According to this study, P.J.Tichenor put forward the Knowledge gap theory and pointed out that knowledge gap regarded groups' socioeconomic status as the major variables which used to study effects of media communication. He argued that with the increasing information disseminated to the society by mass media, people with different socio-economic status got the media knowledge at different levels. People with higher socio-economic status will be faster to get such information than those with low socio-economic status. Therefore, the knowledge gap between the two kinds of people will show a tendency to expand rather than shrink. The theory developed into a complete theoretical framework later. The factors affected the knowledge gap were sorted into two major inspects, that is, macro level (community, social and national levels) and individuals level (individual's subjective sense). At the macro level, socio-economic conditions will determine the existence of the knowledge gap in the different groups. For undergraduates, they neither participate in the social division of labor, nor do they have their own personal income. Therefore, their socio-economic situation correlates to their birthplace, educational level of their parents and other family-related socio-economic backgrounds. In the group with the same socio-economic status, individual factors which including education, professional knowledge of Internet will played an important role in the formation of the knowledge gap. Education is universal knowledge for a person and knowledge of Internet is specifically referred to the expertise gotten by using network. According to this theoretical framework, we conclude the following assumptions:

Hypothesis 1: the higher their Parents' level of Education is, the higher the level of their Internet use is.

Hypothesis 2: Students born in urban have a higher level of Internet use than those born in rural.

Hypothesis 3: The higher the Educational level of students is, the higher the level of their ability to use Internet is.

Hypothesis 4: The more expertise the students got, the higher the level of their ability to use Internet is.

2.2 Use and gratifications theory

Based on psychological motivation and psychological needs, Uses and gratifications theory combining psychological and sociological knowledge explains the behavior that audience use media to meet their needs.

And the theory points out the social causes and psychological motivation that made the audience to accept the media. The hypothesis of "Use and gratifications theory" hold that the audiences are active in the process of receiving the media information and that they have a variety of needs and expectations for different levels and angles of information, such as access to information, entertainment or for social activity. If some of the audiences use certain media to satisfy their needs, or the harvest exceeded expectations, then the media would have a stronger effect on these audiences. Based on Use and gratifications theory and innovation diffusion theory, Zhu (2004) put forward the study and developed a new construct of needs for new media technology, called "Weighted and Calculated Needs for New Media" to fill a gap in the literature on diffusion and uses and gratifications. WCN integrates two subtle but elaborated mechanisms underlying the adoption and use of new media: contrasting between the conventional media and the new media, and the weighting among different needs. As such, WCN predicts that individuals will initially adopt and continuously use a particular new medium only when they feel that the conventional media cannot satisfy a certain need that is important for their life goal and the new media will be able to satisfy the need.. According to this theoretical framework, we make the following assumptions:

Hypothesis 5: The less conventional media (including newspapers, radio, television, film) meet individual needs, the higher the level of students using the Internet is.

Hypothesis 6: The more Internet meet individual needs, the higher the level of college students Internet use is.

2.3 Self-efficacy and attitude theory

Attitude is a person's like or dislike the tendency to an object, behavior, individual, unit, event, or the detachable part of the personal world, This concept emphasis on attitude's measurability attitude is not only a simple concept, it relate to intension, composition, direction, and other factors. There are lots of factors affecting attitude intension. For example, we can measure user's attitude towards Internet from the measurement of the Internet importance to user's life, work and study, the user's attitude towards Internet plays an important role about how to use Internet and Internet self-efficacy is associated with the attitude, which both belong to the emotional concept. While self-efficacy paying attention to the individual's confidence and judgment, researcher defined "self-efficacy" as generalization ability (Bandura, 1986), which includes: Firstly, the self-efficacy is a belief to personal ability, the emphasis of this ability lie in decision-making instead of the consequence evaluation of this behavior. Secondly, self-efficacy concerns the whole results, instead of certain skill or skill level to the whole results. Thirdly, self-efficacy concerns the evaluation about what you will be able to do in the future instead of what you have done in the past. According to the theoretical framework of self-efficacy theory and attitude, we put forward the following hypothesis:

Hypothesis 7: For college students, the higher regarding the value on the Internet, the higher the level of Internet use

Hypothesis 8: For college students the higher regarding the self-efficacy on the Internet, the higher the level of Internet use

3. Methodology

3.1 Sample

A research team collected survey data from Jinan universities in Guangzhou, China. The survey was administered during the May, 2010. A total of 335 respondents completed the survey and 302 are valid, the survey completion rate was 90.1%. Demographic Characteristics of sample was showed in the table 1.Obviously, the key demographic variables of this convenience sample is good (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 1 hour, the minimum net age of is1 year. Combined with the popularity of the University Internet, it can be drawn in the sample that students all have access to Internet, that is, there is no difference between access Internets, that there is no gap between the first digital divide.

3.2 Dependent variable

In this study, the analysis object is college students' second-level digital divide, which is the usage gap of the Internet. Therefore, dependent variable of this research includes the following two dimensions:

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

The purpose of Internet use. According to the research needs, we are mainly to focus whether the conduct of Internet use is to obtain knowledge about learning or working Therefore, this article uses the following questions

measure: As following actions, your frequency is (1 = never use, 2 = rarely used, 3 = sometimes used, 4 = more frequently used, 5 = often used). 12A, use e-mail to learn and study work-related information; 12B, participate in online chat, discussion and learning things about life; 12C, through a search engine in Internet search and learn living-related information; 12D, visit relevant website, BBS that published professional knowledge and related to learning and living; 12E, to use blog for uploading articles about study and life. For this purpose Internet access will be directly changed 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 also belong to a continuous variable.

3.3 Independent variable

3.3.1 Family socio-economic background variables: (1) parents'level of education. Past research showed that educational level of parents affects the acquisition of cultural knowledge of young people (Feng Xiaotian, 2005). In order to better explore the influence that the educational level of parents have on young people skills of the Internet, we take any college and above the standard level of education as standard, father or mother received any college education and higher level = 1; received any college education= 0.(2)birthplace. As the use gap of the Internet between city and non-urban becomes different, we set urban = 1, urban and rural = 0 for the assignment.

3.3.2 Knowledge variables, (1) Educational level (continuous variable). According to different educational levels accepted by years of education about the assignment: freshman or sophomore = 13, junior or senior = 15 master = 17. (2) The level of Internet knowledge. Internet knowledge is the expertise use of Internet, which may be related to knowledge and Educational levels or may not. Internet knowledge can be defined as a range of Internet characteristics which formed within a certain period of time (Po-tosky, 2007). Internet knowledge, including the daily use of the Internet is closely related to two aspects: to know what is on the Internet knowledge and what can be done through the Internet (Page & Uncles, 2004). These two dimensions can be referred to as declarative knowledge and procedural knowledge (Best, 1989; Page & Uneles, 2004). Declarative knowledge refers to the knowledge people have on the specific Internet-related terms such as Cookies, browser (browsers), while procedural knowledge refers to the knowledge people have about how to operate the Internet to implement tasks. In this study, whether know the following knowledge or not is a measure on the declarative knowledge. A, know "worm" virus, such an Internet? B knows what is "sticky"? C, know what is Cookies? D, know what a "proxy server"? E, know what is the Internet video in the "buffer"? Know that = 1, do not know = 0.In the same way, procedural knowledge is measured by the following questions: A, know how to deal with the "worm" virus B, know how to post "top"? C, know how to use Cookies? D, know how to set the "proxy server"? E, know how to deal with Internet video the "buffer" of this phenomenon? Know = 1, do not know = 0. Support item score and then the sum of knowledge for the Internet variable value.

3.3.3 The media usage to meet the needs of motivational variables: (1) Conventional media (newspapers, radio, television, movies, etc.) which can meet the needs of the following areas (1 = completely satisfied; 2 = half satisfied; 3 = half satisfied, half not satisfied; 4 = most of meet; 5 = completely satisfied), the branch option A, understand the domestic and international news events; B, to obtain personal information (such as shopping, tourism, investment, medical and health knowledge); C, get the work / study information (such as employment, education, work or study to improve the level of knowledge and skills); D, entertainment or personal hobbies (such as playing games, listening to music, sports, news); E, express their own views on a variety of public affairs; F, enhance emotional exchanges (meet new friends, maintain relationships with existing friends), the sum of the actual scores assigned to meet the audience demand for the conventional media, variable motivation. (2) Internet which can meet the needs of the following areas (1 = completely satisfied; 2 = half satisfied; 3 = half satisfied, half not satisfied; 4 = half satisfied; 5 = completely satisfied), the branch option A, about domestic and international news events; B, to obtain personal information (such as shopping, tourism, investment, medical and health knowledge); C, get the work / study information (such as employment, education, raise the level of work or study knowledge and skills); D, entertainment or personal hobbies (such as playing games, listening to music, sports, news); E, express their own views or advice on a variety of public affairs; F, enhance emotional exchanges (meet new friends, maintain and have A friend's relationship), the sum of the actual scores assigned to meet the audience demand for Internet motivation variable.

3.3.4 Attitude and self-efficacy variables, (1) Attitude toward Internet. Respondents were asked the following question "how important Internet in your life, work / study? " ,which option is measured as following ① most important = 5; ② very important = 4; ③ indifferent or do not know / hard to say = 3; ④ not very important = 4; ⑤ unimportant = 5. (2) Internet self-efficacy. This study used six items to measure personal confidence in their evaluation of the use of the Internet, including online activities, such as information search, and to communicate,

to solve practical problems. We asked respondents to mark their statements in five Likert scale on the six degree of agreement, the greater the number the higher the extent of that agreement, of which 1 represents "completely agree" and 5 represents "completely agree". The specific projects: A, I am confident that I can use the web search to get the information I need; B, I am confident that through the Internet I can solve practical problems; C, I am sure the Internet is a good tool to communicate with people; D, I am confident that through the Internet I can complete something that needs to be done; E, I think that I can use Internet equipment well; F, Even there is no help, I can complete related work through the Internet. And then sum up the scores as self-efficacy variable.

3.3.5 Demographic variables. (1) Gender. M = 1, female = 0. (2) Age (continuous variable)

3.4 Data

The dependent variable the time of Internet use, and Internet use index about learning and working of dispersion coefficient (the standard deviation of the sample data and the corresponding average ratio) 0.56 and 0.18,is larger than dispersion coefficient (both 0.08) of age and Educational level. This shows that the dispersion of the sample data is relatively large. It also said that there is a sizeable gap in Internet use level among college students (the time of Internet use, and Internet use index about learning and working), that is, relatively large second-level digital divide.

4. Results

In this study, as the dependent variable is continuous variable, independent variable is category variables (dummy variables) or a continuous variable, the use of multiple linear regression analysis of the time of Internet use and Internet use index about learning and working as the dependent variable regression variables respectively, table 3 is as following:

Table 3 show that the predictors factors of five independent variables which are family socio-economic background variables, Knowledge variables, Using the media to meet the demand variables, Attitude and self-efficacy variables, demographic variables on college students predicts 18.5%of the time of Internet use, while predicting 20.6% of Internet use index about learning and working. Though these predictors factors are not much significance, its regression equation can be tested by F (Two regression equations' F test are significant, Sig<0.000).

However, the dependent variable in the interpretation of different time, a specific interpretation of each variable is different. According to some previous study experience, this study sets the significance level of each variable at 0.05, which is if Sig is less than 0.05, it is through the test of significance. Therefore, the time of Internet use for students, family socio-economic background variables in this group, father education (Sig = 0.50) and maternal education (Sig = 0.81) failed in the test of significance, and for Internet use index about learning and working of the result of variables, family socioeconomic background variables of the father in this group education (Sig = 0.28) and maternal education (Sig = 0.13) did not pass the same test of significance, hypothesis 1 failed to pass testing. But another variable the place of birth (Sig =0.00) toward the time of Internet use for students passed the test of significance. But the place of birth (Sig =0.13) toward Internet use index about learning and working failed to pass the test. The place of birth in the regression equation, the Beta is 0.32, which shows that the urban student's Internet use time is longer than that non-urban. But in dependant variable------ Internet use index about learning and working, the college students' birth place has not marked influence. This shows that though the place of birth may influence their online time, it does not affect their using aims, the purpose should own to other reasons. So hypothesis 2 is tested partly.

Knowledge of these variables in the educational level of college student's the time of Internet use Beta is -0.18, Sig is 0.01. Although the significance test passed, the standardized regression coefficient was negative, indicating that the lower Educational level of the students, the more time online long, that is to use the higher level, with the hypothesis 3 in the opposite direction. Therefore, it is not through hypothesis testing, and Educational level with study, work-related Internet use index of Beta 0.11 .Although positive, but the Sig is 0.11,it did not pass the significance test, therefore, hypothesis 3 does not pass inspection. Another variable Internet professional knowledge of web-based time (Sig. = 0.19) and and Internet use index about learning and working (Sig. = 0.20) both had no significant effect due to variable, hypothesis 4 is not through testing. That is to say, college students with professional knowledge of the Internet use ha nothing to do with Internet use level.

Among using media to meet the needs variables, using conventional media predicts students the time of Internet use (Sig. = 0.09) and with Internet use index about learning and working (Sig. = 0.12) had no significant effect, that is to say, hypothesis 5 failed in the test. Internet use to meet the needs predicting on college students the time of Internet use (Sig. = 0.52) also had no significant effect, but with Internet use index about learning and

working (Sig. = 0.01) there are significant effects, and Internet use motivation and learning to meet the demand, work-related Internet use Beta (standardized regression coefficient) was 0.17, that is, the Internet use to meet the needs of the higher motivation, students with Internet use index about learning and working higher. Hypothesis 6 was tested partly.

Attitude and self-efficacy in this group of variables, on the Internet, the impact on students the time of Internet use values in the Beta is 0.16, Sig was 0.00, meaning that students on the Internet, the higher the value of their online time more high, and it is through the test of significance. While on the Internet, college students with Internet use index about learning and working of value , Beta is 0.18, Sig is 0.00, meaning that the value of university students on the Internet, the more high, with learning, work-related Internet use, the higher the index, and it passed the test of significance. Therefore, hypothesis 7 was tested. Another independent variable self-efficacy of college students value in Internet use time, the Beta is 0.13, Sig is 0.03, meaning that the higher students on the Internet self-efficacy, the higher the the time of Internet use, and can be significantly tested; and self-efficacy variables and Internet use index about learning and working of value in the Beta (standardized regression coefficient) was 0.24, Sig was 0.00, meaning that students on the Internet, the higher the value of self-efficacy , with study, work related to the higher level of Internet use, and it passed the test of significance. Therefore, hypothesis 8 was tested.

Demographic characteristics of these variables, the gender impact of college students the time of Internet use (Sig. = 0.76) failed to pass the test of significance, with Internet use index about learning and working (Sig. = 0.01) passed the significant test, indicating that men and women with learning, work-related Internet use were significantly different; the age of the impact on college students the time of Internet use (Sig. = 0.60) failed to pass the test of significance, with Internet use index about learning and working (Sig. = 0.54) also failed to pass the test of significance.

5. Conclusion and Discussion

Overall, the research shows that hypothesis 2 is partly through tested, which was conducted from the theoretical framework of knowledge gaps; hypothesis 6 is partly through tested, which was conducted from the theoretical framework of Uses and gratifications

In this study, the most notable conclusion is that attitude and self-efficacy variables, which were conducted from the theoretical framework of self-efficacy and attitude theory, had a significant positive, hypothesis 7 and hypothesis 8 have been hypothesis tested. Therefore, this study shows that the sensibility factors of Internet use, including the attitude toward the Internet and the Internet self-efficacy, have significant positive effects on the level of Internet use, including the time of Internet use and the index of Internet use about studying and working.

Of course, this study has some limitations. On the one hand, while the dependent variable for the second level of the digital divide ----- gap between Internet use, by using the division number and use of quality, but the quality will be used directly equivalent to the purpose of use, eventually attributed and Internet use index about learning and working, although analysis of the data reflected a relatively good conclusion, there's one-sided suspicion. So the future research can divide the second-level digital divide more detailed, from multiple angle measurements, and comprehensive analysis of the users of the level of Internet use between the gaps. On the other hand, the limitations of this study lie in the convenience sampling method used, which limits the conclusions of the study that can be summarized as resistance. Despite the convenience sample for the purpose of hypothesis testing is adequate, but for the conclusion of the study and to promote the wider population, random sampling is necessary.

Despite these limitations, this study made on the second division of the digital divide, especially the level of Internet use not only used to measure the time of Internet use, also used with the Internet use index about learning and working to measure the latter directly and knowledge and increasing access to relevant, therefore it can reflect differences in the students use the Internet to acquire knowledge of the conditions and gaps, which can help students understand and reduce the second-level digital divide the analysis of significance. The other hand, data analysis, the Attitude toward the Internet and Internet self-efficacy of these affective factors appear a particularly important influence, not only developed the theory of knowledge of the digital divide, but also in practical ways for communicators to improve students using the Internet to obtain more knowledge, and second among college students reduce the digital divide and so has important practical significance.

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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%)

Table 2. The distribution of variable status (N = 302)

Variable	The distribution of variable status	
Dependent variable (continuous variables)	Mean	Standard deviation
Internet use time	5.68	3.19
Internet use index about learning and working	19.23	3.5
Independent variables (continuous variables)	Mean	Standard deviation
Age	22.6	1.85
Educational level	15.75	1.3
The level of Internet knowledge	6.4	3.89

Table 3. Multiple linear regression: Analysis factors of dependent variables

		Dependent variables			
		The time of Internet use		Internet use index about learning and working	
	Independent variables	Beta	Sig.	Beta	Sig.
Family socio-economic background variables	Father education (Non-college above=0)	-0.04	0.5	-0.07	0.28
	Mother education (Non-college above=0)	-0.02	0.81	0.1	0.13
	Place of birth (General town and country=0)	0.32**	0	-0.09	0.13
Knowledge variables	Educational level	-0.18*	0.01	0.11	0.11
	The level of Internet knowledge	0.07	0.19	0.07	0.2
Using the media to meet the demand variables	Motivation to use conventional media to meet the demand	-0.1	0.09	-0.09	0.12
	Motivation to use Internet to meet the demand	-0.04	0.52	0.17**	0.01
Attitude and self-efficacy variables	The attitude toward Internet	0.16**	0	0.18**	0
	Internet self-efficacy feelings	0.13*	0.03	0.24**	0
Demographic variables	Gender(female=0)	-0.02	0.76	0.14**	0.01
	Age	0.04	0.6	-0.04	0.54
Adjusted R Square		0.185		0.206	
F		7.188		8.062	

Note: * sig(p)<0.05; ** sig(p)< 0.01