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## Computer and Internet Use Intention among Chinese Older Adults: Two Stages of Study

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**Abstract:** Constructive use of leisure time might provide the elderly with opportunities to develop their skills and abilities, expand social network and feel good about themselves and an increase use of Information and Communication Technology (ICT) might give the elderly more choice of leisure activities and create the feeling of satisfaction, competency and self-esteem among them. This study investigated factors that the elderly's intentions to use Computer and Internet, the researchers based on previous validated studies and offered a new theoretical model in examining the influences of the two mediating factors-Computer self-efficacy and outcome expectations on the elderly's intentions in adopting a new technology (i.e., Computer and the Internet) and their perceptions of their knowledge in utilizing this technology. The elderly are categorized as one of the technologically and sociologically disadvantaged groups within the context of the digital divide. Two studies were conducted and a set of conclusions was reached. In general, the findings gave strong supports to the proposed model. Encouragement by others exerted influence on Computer Self-efficacy (CSE) and outcome expectations in the two studies. Support had no effect on CSE in the first study but yield significant impact to CSE in study two.

**Key words:** Computer, internet, use intention, technology adoption models, elderly

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### INTRODUCTION

From the observation of researchers, the aged is sometimes ignored about their needs and their mental health in Chinese society. Perhaps the information and communication technology (ICT) might contribute to the development of independent old people in this case. For instance, for senior citizen who are unable to travel as they carry through in the past, the Internet can bring globe in the whole world to them and supplies them with tremendous information, pastime, convenience and communication with their families. The researchers recommend that the elderly could be encouraged a sense of self-efficacy by using the Internet, so, they are not going to be dependent on others. Constructively using their leisure time use can provide the elderly people with the opportunity to develop their skills and capabilities, expand the social network and make them feel good; secondly, the increased use of information and communication technology may give the elderly to choose more leisure activities and create a sense of satisfaction, competence and self-esteem among them; and thirdly, it is also suggested that the ability of the elderly are interested in lifelong learning and they have the ability of it (Lansdale, 2002). The elderly who learn and

master Internet-related skills can improve their happiness by means of assert them keeping a good sense of integrity and continuity in association with their past. Fourthly, the aged could be benefit from using their fingers and moving their hands when operating keyboard (McGuire, 1986). The program of the computer could boost cognitive functions which consist of auditory memory, comprehending, reading and information processing, perceptual-motor and self-esteem of elderly. A number of studies make sure that the games of video bring on obviously a series of perceptual-motor and self-esteem of the aged (McGuire, 1986).

How to improve the consciousness of ICT amongst the aged and their technical abilities of using ICT? Why the old man so hesitate to use ICT? What are the obstacles they are facing? First of all, people have biased impression on their ability and willingness of the elderly learning intellectually challenging task in the society. In the appropriate application and training, the elderly can also be full of vitality and passion for computer (Shapiro, 1995). Secondly, for the elderly with a limited income, regard the cost of ICT devices as a luxury. And the third, especially for Chinese elderly, language and the ability to read and write barriers. Many of the services and language in computer are in English,

blocking the older people with low education from the use of information and communication technology.

Against this background, the objective of the current study is to explore the factors that intentions of the aged to use Computer and Internet. On the basis of former validated studies and provided a fresh theoretical model to examine the influences of the two mediating factors-Computer self-efficacy and outcome expectations.

## RESEARCH MODEL AND HYPOTHESES

This study is a collaborative work with the Cyber Senior Network and Development Association Limited, Internet Professionals Association, Jiangsu Province Senior IT Advocates and indirectly with the Social Welfare Department of Jiangsu Province. This research was conducted during the period from July 2011 to February 2012. Training courses were offered to the elderly and they completed a self-reported questionnaire in measuring their confidence and capabilities in using computers and the Internet. The target population was adults aged 55 above of woman and 60 above of man and who resided in Jiangsu province.

**Behavioral modeling training method:** In this research, the behavioral modeling training method is incorporated into the research model and its positive influence on the elderly's learning of computers is assumed. Previous studies have shown that prior performance exerted influence on self-efficacy, outcome expectations and performance (Schunk, 1981). Since enactive mastery is held to be the strongest source of information of self-efficacy (Bandura, 1986), the elderly were assured that they would have a positive hands-on experience in mastering online activities.

**Encouragement by others:** In the current case, the elderly might respond to the opinions of others by forming judgments about their own abilities in using the Internet. Encouragement of use may also exert an influence on outcome expectations. At the very least, they will expect that their peers will be pleased by the behavior. Thus, the first two hypotheses are as follows:

**H1:** The higher the encouragement received from the members of the elderly reference group in using computer, the higher the elderly's Computer self-efficacy.

**H2:** The higher the encouragement received from the members of the elderly reference group in using computer, the higher the elderly's outcome expectations.

**Support:** Support can be expected to influence outcome expectations because this support reflect the expectations

of the institution towards the behavior and may therefore provide clues about the likely consequences of using the computer. Thus, hypotheses 3 and 4 are as follows:

**H3:** The better the support provided for the elderly at the learning institution, the higher their Computer self-efficacy.

**H4:** The better the support provided for the elderly at the learning institution, the higher their outcome expectations.

**Computer self-efficacy:** Current studies define Computer self-efficacy (CSE), refers to a judgment of one's capability to use a computer it is not concerned with what one has done in the past, but rather with judgments of what could be done in the future. Moreover, it does not refer to simple component subskills, like formatting diskettes or entering formulas in a spreadsheet. During computer trainings, the elderly learnt some basic computer concepts during trainings. By doing so, the investigators could appropriately measure elderly's Computer usage intentions and their capabilities. The hypothesis is:

**H5:** The higher the elderly's Computer self-efficacy, the higher their outcome expectations.

It is believed that the elderly will experience a lot of anxiety and then worry that they will cause chaos on the computers. By including the construct, anxiety, at this early stage of the study, a plausible research model for better interpretation and prediction can be obtained. This relationship is predicted by hypothesis 6 as follows:

**H6:** The higher the elderly's Computer self-efficacy, the lower their degree of anxiety.

**Usage intention:** This hypothesis is supported by research regarding computer use (Burkhardt and Brass, 1990). In this specific context, the elderly were offered computer training for the first time; thus, their intentions of future usage is measured instead of actual usage.

**H7:** The higher the elderly's Computer self-efficacy, the higher their intentions of computers and the Internet usage.

**Perceived user competence:** Munro *et al.* (1997) proposed a specific research model on user competence and its relationship with certain individual factors: Self-efficacy, usage and demographics. As the elderly were computer novices in this research, the elderly's perceptions of their capabilities in using computers and the Internet are measured rather than the

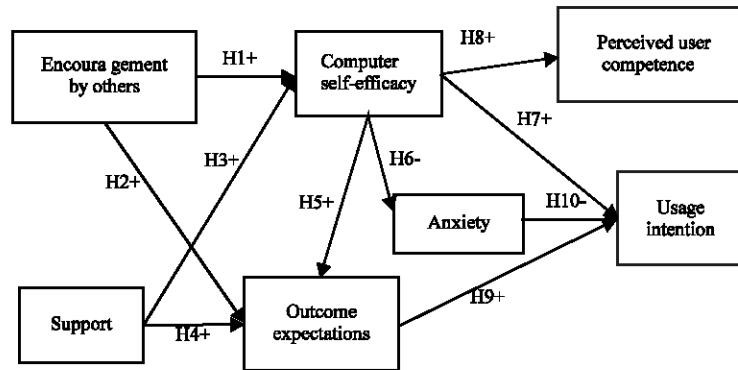


Fig. 1: Proposed research model of computer and internet use intention among Chinese older

elderly’s actual knowledge. Thus, this construct is added into the model by proposing the following hypothesis:

**H8:** The higher the elderly’s Computer self-efficacy, the higher their perceived user competence.

**Outcome expectations:** Outcome expectation is an important predecessor to usage behavior. According to SCT, individuals are more likely to engage in behavior they expect will result in favorable outcomes. The hypothesis is also supported by IS research (Davis *et al.*, 1989). Accordingly, the next hypothesis is:

**H9:** The higher the elderly’s outcome expectations, the higher their intentions of computers and the Internet usage.

**Anxiety:** Feelings of anxiety surrounding computers are expected to negatively influence computer use. Not surprisingly, people are expected to avoid behaviors that arouse nervousness. A numbers of studies have demonstrated a relationship between computer anxiety and the use of computer (Igarria *et al.*, 1989). This gives rise to the following hypothesis:

**H10:** The higher the elderly’s computer anxiety, the lower their intentions of computers and the Internet usage.

Based on the study, the relations among the components in the model are shown in Fig. 1, several key constructs are integrated into the proposed model: Encouragement by others, outcome expectations and anxiety. Additionally, three constructs are expanded upon: Computer self-efficacy, support and usage intention, other’s use and usage.

**RESEARCH DESIGN**

In study one, advertisements about free computer literacy training courses were placed at several local

newspapers. Potential participants were first screened during a telephone interview to ensure that they had little prior experience with computers. While some participants had used computers before, they all considered themselves to be novices. Study one was conducted as an exploratory study. Investigators intended to validate the items and the measurement scales for the new constructs in the proposed models, such as Computer self-efficacy, usage intention and perceived user competence. Subsequently, study two was conducted as a confirmatory study. Participants from study one were invited to take the computer literacy training courses for the second time.

**Pretest of questionnaire and pilot study:** A pretest of the questionnaire was conducted with ten people, including four scholars from the Faculty of Economics and Management at a local university, three social workers and three administrative staff of enterprise. Each respondent completed the questionnaire and provided feedback regarding the wording of the questions, the process and the measures. A pilot study involving 58 elderly from the sampling frame (n = 100) was also conducted. In this pilot study valuable feedback on the questionnaire instrument was given and the sample size of this survey (n = 1,000) was defined.

**Training sessions:** Previous research findings on designing quality computer training program for older learners were taken into consideration for this study (Bolton, 1978; Knowles, 1980). In both studies one and two, twelve tutors, previously trained by the collaborators to teach the elderly basic computer and Internet skills, were hired to conduct the training sessions. The 5 h computer literacy training course included 2 h lecture, demonstration and hands-on practice session. The class size was limited to 40 participants.

The lecture (45 min) provided basic information about the computer equipment, the operating system being

used and the techniques of browsing the Internet. Participants were shown how to operate the keyboard and mouse in order to browse websites, exchange emails and ecards, listen to online radio and play online games. The tutors followed a fixed outline but questions related to this course were answered as they arose. Next, participants were given 50 min to practice what they had learned. Training notes and pre-registered email logins, passwords and email addresses were also given to participants. Following the practice session, a self-reported questionnaire and a self-assessment on the capabilities in using computer and the Internet were administered. At the end of the training session, “Certificates of Completion” were presented to participants.

**RESULTS AND DISCUSSION**

**Study one:** A total of 680 elderly attended the computer training classes, thus the response rate was 68.0%. While this response rate could be acceptable for research of this nature, a non-response bias was a concern and Compeau and Higgins’ (1995) approach in weighing non-response bias was followed. Using the early (first 10 days) and late (after 30 days) responses to the questionnaire, a multivariate analysis of variance (MANOVA) was undertaken to determine whether differences in response times (early versus late) were associated with different responses. The variation of demographic data (i.e., age, gender and education level) of respondents was tested. A two-way mixed (between-within) ANOVA test from SPSS17.0 indicated no significant differences in any of the variables of interest ( $\lambda = 0.997$ ;  $p = 0.883$ ). Data analyses were performed using LISREL8.7. The results are shown in the Fig. 2, as can be seen from Fig. 2, 7 out of 10 paths were found to be significant, among them hypotheses  $H_1, H_2, H_4, H_6, H_7, H_8, H_9$  were proved to be significant, results show that for potential adopters,  $H_1$  path coefficient = 0.316,  $H_2$  path coefficient = 0.418,  $H_4$  path coefficient = 0.613,  $H_6$  path coefficient = -0.311,  $H_7$  path coefficient = 0.326,  $H_8$  path coefficient = 0.573,  $H_9$  path coefficient = 0.279; but hypotheses  $H_3, H_5, H_{10}$  were not significant.

The explanatory power of the model was fair, but the model provided an understanding of behavioral outcomes. Table 1 presents the individual item loadings (reflective) of the five latent variables and Table 2 presents the individual item weights (formative) of the two manifest variables.

**Study two:** Participants from study one were invited to the computer literacy training courses offered in study two

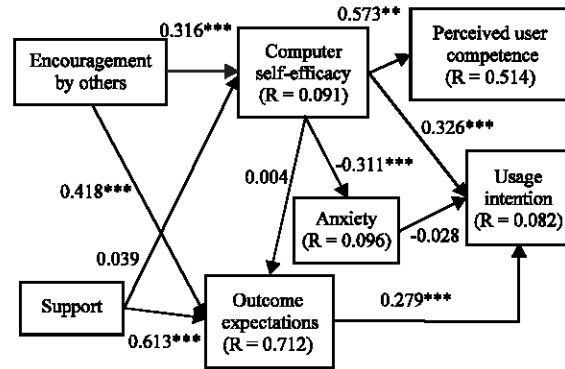


Fig. 2: Study one model and path coefficients of computer and internet use intention among Chinese older adults \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 1: Study one-individual item factor loadings of the latent variables of proposed research model of computer and internet use intention among Chinese older adults

Item	Factor loading
<b>Computer self-efficacy</b>	
Confidence in using application software	0.8573
Confidence in using input method	0.8846
Confidence in browsing file	0.8291
Confidence in using keyboard	0.8435
Confidence in using mouse	0.8861
<b>Outcome expectations</b>	
Perform 1-Read health information	0.8324
Perform 2-Send e-mails	0.8310
Perform 3-Take online courses	0.8132
Pers 4-Catch up with the social trends	0.7121
<b>Anxiety</b>	
Anxiety 1	0.7538
Anxiety 2	0.8143
Anxiety 3	0.7872
Anxiety 4	0.8481
<b>Usage intention</b>	
Usage 1-Frequency	0.7847
Usage 2-Duration	0.8512
<b>Perceived user competence</b>	
Knowledge in using mouse	0.7510
Knowledge in typing characters	0.7614
Knowledge in browsing web site	0.7935
Knowledge in sending e-mail	0.8576
Knowledge in using Windows XP English version	0.7436

and a total of 446 elderly attended. The response rate was 65.6%. Respondents were identified and matched in both studies by a unique, pre-assigned email account and an advanced class voucher. In order to assess non-response bias, a comparison of demographics was made on study one demographic data for respondents who completed only the study one survey and those who completed both study one and two surveys. An independent-samples t-test in SPSS17.0 revealed no significant differences for age ( $p = 0.667$ ), gender ( $p = 0.536$ ) and education level ( $p = 0.486$ ), at 0.05 level. In this study, the two constructs, “anxiety” and “perceived user competence” from the proposed model. Firstly, it became clear that

Table 2: Study one-individual item weights of the two manifest variables of proposed research model of computer and internet use intention among Chinese older adults

Item	Factor weight
<b>Encouragement by others</b>	
Encour 1-Tutors and helpers	0.4351***
Encour 2-Family	0.1231
Encour 3-Peers	0.4465***
Encour 4-Social workers	0.4124**
<b>Support</b>	
SP 1-Keyboard/mouse	0.1784**
SP 2-Computer equipments	0.4835***
SP 3-Lab settings	0.1647
SP 4-Lecture notes	0.4107***
SP 5-Windows XP english version	0.0761
SP 6-Class size	0.3027***

\*\*\*Significant at 0.01 level

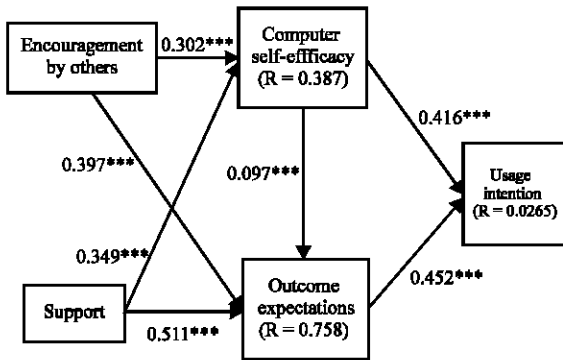


Fig. 3: Study two model and path coefficients of computer and internet use intention among Chinese older adults, \*p<0.10, \*\*p<0.05, \*\*\*p<0.01

“anxiety” had no direct effect on usage intention. Secondly, based on the elderly’s feedback from study one; they were physically exhausted in having to answer such lengthy questionnaire. In order to collect truthful responses from the elderly, the investigators decided to remove these two constructs and related paths in hoping to preserve the model’s explanatory and predictive powers. In this study, all 7 paths provided support to the hypotheses, the results are shown as Fig. 3. As can be seen from Fig. 3, 7 paths were found to be significant, H<sub>1</sub> path coefficient = 0.302, H<sub>2</sub> path coefficient = 0.397, H<sub>3</sub> path coefficient = 0.349, H<sub>4</sub> path coefficient = 0.511, H<sub>5</sub> path coefficient = 0.097, H<sub>6</sub> path coefficient = 0.452.

The explanatory power of the model significantly improved compared to the study one result. Table 3 presents the individual item loadings (reflective) of the three latent variables and Table 4 presents the individual item weights of the two manifest variables. The reliability and discriminant validity coefficients are reported in Table 5.

Table 3: Study two-individual item loadings of the three latent variables of proposed research model of computer and internet use intention among Chinese older adults

Item	Factor loading
<b>Computer self-efficacy</b>	
Confidence in using application software	0.8426
Confidence in using input method	0.8124
Confidence in browsing file	0.8451
Confidence in using resource manager	0.7421
Confidence in editing documents	0.7681
<b>Outcome expectations</b>	
Perform 1-Read health information	0.8242
Perform 2-Send e-mails	0.8410
Perform 3-Take online courses	0.7645
Pers 1-Feel sense of accomplishment	0.8345
Pers 2-Catch up with the social trends	0.8324
Pers 3-Knowledge sharing with family and peers	0.8567
<b>Usage intention</b>	
Usage 4-Interest in using the computer and the Internet	1.0000

Table 4: Study two-individual item weights of the two manifest variables of proposed research model of computer and internet use intention among Chinese older adults

Item	Factor weight
<b>Encouragement by others</b>	
Encour 1-Tutors and helpers	0.3540***
Encour 2-Family and peers	0.5684***
Encour 3-Social workers	-0.0982
Encour 4-Myself	0.5744***
<b>Support</b>	
SP 1-Keyboard/mouse	0.3067***
SP 2-Computer equipments	0.2549***
SP 3-Lecture notes	0.2760***
SP 4-Windows xp english version	0.3628***

\*\*\*Significant at 0.01 level

Table 5: Study two-reliability and discriminant validity coefficients of the three latent variables of proposed research model of computer and internet use intention among Chinese older adults

Construct	ICR	CSE	Outcome expectation	Usage intention
CSE	0.901	0.810		
Outcome expectation	0.931	0.502	0.822	
Usage Intention	1.00	0.437	0.461	1.00

ICR: Internal consistency reliability

Diagonal elements are the square root of the variance shared between the constructs and their measures. Off diagonal elements are the correlations among constructs. For discriminant validity, diagonal elements should be larger than off-diagonal elements.

### CONCLUSION

Overall, the findings gave strong supports to the proposed model. Encouragement by others exerted influence on Internet Self-efficacy (ISE) and outcome expectations in the two studies. Support had no effect on ISE in the first study but yield significant impact to ISE in study two. The impact of ISE on outcome expectations in study one was weak compared to the strong impact in study two. Outcome expectations had significant

influence on usage intention and its path coefficient intensified from study one to study two. In the future, IS researchers can proceed to directly measure the link between Internet self-efficacy and actual use and its reciprocal relationships.

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