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Evaluate the Usability of the Mobile Instant Messaging Software in the Elderly

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Abstract

Purpose: Instant messaging (IM) is one kind of online chat that provides real-time text transmission over the Internet. It becomes one of the popular communication tools. Even it is currnetly an era of smartphones, it still a great challenge to teach and promote the elderly to use smart phone. Besides, the acceptance of the elderly to use IM remains unknown. This study describes the usability and evaluates the acceptance of the IM in the elderly, who use the smartphone for the first time. This study is a quasi-experimental design study. The study period started from October, 2012 to December, 2013. There were totally 41 elderly recruited in the study. All of them were the first time to use LINE app on the smartphones. The usability was evaluated by using the Technology Acceptance Model which consisted of four constructs: cognitive usability, cognitive ease of use, attitude and willingness to use. Overall, the elderly had the best "attitude" for LINE APP communication software, with the highest rating averaging 4.07 points on four constructs, followed by an average of 4 points on "cognitive usefulness". The socres of "cognitive ease of use" and "willingness to use" scores were equal which are an average score of 3.86. It can be interpreted that (1) the elders thought that the LINE APP as an excellent communication tool for them; (2) they found the software is useful (3) it was convenient for them to communicate. However, it was necessary to additionally assist and explain the certain functions such as the options. It would play a great role in the "willingness to use". The positive acceptance of LINE APP in elderly refer to the probable similar acceptance for them to use other communication software. Encouraging the willingness the elderly to explore more technology products and understanding their behavior will be the basic knowledge to develop further software.

Keywords:
Technology; Instant messaging (IM); Technology Acceptance Model

Introduction

Aging of the population is an irreversible change. The effective promotion of using the technologic product in the elderly can enhance the "active ageing". In the past studies have shown the dependence of an elderly person relied on the several factors which were recognized as primarily functional and cognitive impairment, chronic diseases, a diminishing social network, and a low level of physical activity. However, effectively using the IM can make their lives more abundant and enhance their interpersonal relationships.

The alleviation of the chronic diseases and enhancement of the subjective happiness result in higher self-apprasial in health condition. By the contrast, it is not prone to develop into depressive mood and the related symptoms.[2]

The effective use of mobile communication software for the elderly will reduce the social isolation, conversely, make them confident and be willing to participate in the community activities and their interests. [3] [4]. Therefore, it is a solution for the most elderly people to get positive attitudes towards technology [5] [6].

In the past, many studies have explored the use of technology acceptance patterns to compare the acceptance of application-related technologies such as Mobile Health, Telehealth, and Telecare for the elderly.

The Technology Acceptance Model (TAM) was developed by Davis (1989) on the basis of rational behavioral theory TRA. This model to predict and explain a person's adoption of information technology. It consists of (1) the usefulness awareness (2) the easy of the use (3) the use of attitude (attitude toward use) (4) the use of the behavioral (actual use) [7]. In TAM, usefulness awareness and ease of use cognition are considered to directly affect the use of attitude [8]. When a technology is easy to use, it is easier for the user to think that it is useful [9] [10].

Therefore, the concept of technology acceptance model was applied to develop the the certain questionnaire which will clarify the relationship between cognitive use, cognitive usefulness, use attitude and willingness to use communication software in the elderly. The feasibility of this model-based study will be the bluprint and reference of the further system construction.

Methods

This study is a quasi-experimental design study. The study period started from October, 2012 to December, 2013. The program was held at a regional urban hospital in Taipei City. Each participant was provided with an android-based smart phone including a charger, a memory card, and a mobile phone number. There are two lectures during the study period.

The first lecture was held to instruct the participants to use the basic function of the mobile phone. The second lecture in one month later was held to instruct the participants to operate the IM app "LINE" and its group chating. The feedback from the participants was collected in the same lectures. Three months after the first lecture, the participant completed the TAM-based questionnaire. The feedback and trouble analysis were also done.

The reliability and validity of the questionnaire

In order to ensure the validity of the contents of the questionnaire, a seven-experts panel meeting was held to assess the relevance and the completeness. The four experienced experts devoted themselves to geriatric researches and the other three engineering background experts dedicated to the programming on the mobile devices. The experts provided suggestion of the relevance, comprehensiveness of the content and the grammar. The questionnaire contains four construct as the cognitive usefulness, cognitive ease of use, the use of attitude and the use of will. Besides, the troubles while using LINE all were also collected and analyzed. Acceptance were measured on a Likert scale of five points, with 1 being strongly disagreeable, 2 being disagree, 3 being no opinion, 4 being consent, and 5 being very agreeable. The expert evaluates the validity of the scale according to the item, content and description of the questionnaire. Content validity index (CVI) was 0.63 and the internal consistency (Conbach's alpha) was 0.824.

Data processing and analysis

The results were analyzed with SPSS 23 statistical software to describe the distribution of variables. Descriptive t-test and one-way ANOVA were used to analyzed the effects of the four constructs from the individual factors such as gender, age, educational level, the experience of using traditional mobile phones or smartphone and the understanding of LINE APP and other attributes.

Results

There were 49 participants initially recruited, and only 41 participants completed the survey. The (Figure 1).

The basic properties of the study object

There were 61% female and 39% male participants. The majority of age was 60-69 years old (60.90%). There were 34.1% college-educated participants. The majority of the monthly family income was the group less than USD$940.97 were family income (39%). Most of the participants (68.3%) had the limited experience of using traditional mobile phones and smart phones less than five years. However, 28 of 41 (68.3%) participants tried to download LINE app during the study period. (Table 1)

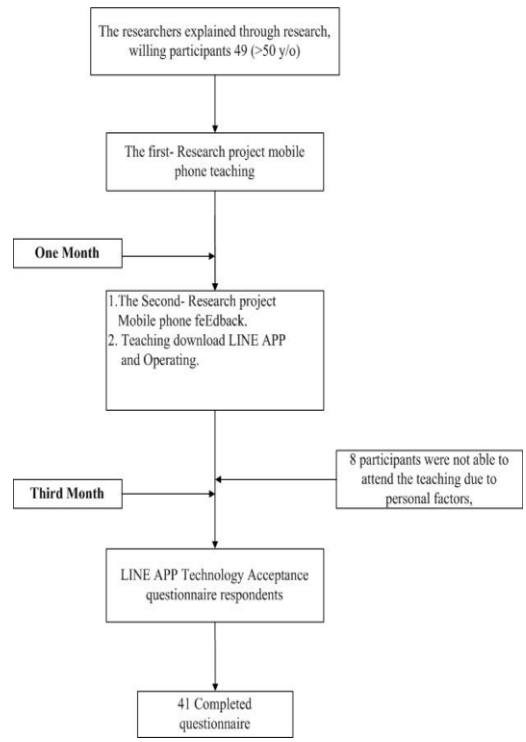

Figure 1 - Study the flow chart

Table 1 - The demographic data of the subjects described the statistical results. (N = 41)

Variable	n	%
Gender		
Male	16	39%
Female	25	61%
Age		
50~59 y	7	17.10%
60~69y	27	65.90%
70~79y	6	14.60%
>80y	1	2.40%
Education		
Illiterate	1	2.40%
Elementary school	2	4.90%
Junior High school	8	19.50%
Senior High school	11	26.80%
College / University	14	34.10%
Graduate school	5	12.20%

Monthly Home Income		
< USD$940.97	16	39.00%
USD$941~1568.26	3	23.00%
USD$1568.29~2195.57	10	14.40%
USD$2195.60~2822.88	10	24.40%
>USD$2822.92	2	7.90%
Experience of using traditional mobile phones and smartphone experience		
< 5 years	28	68.30%
5~10 years	4	17.10%
11~15 years	7	9.30%
>15 years	2	4.90%
The experience of downloading LINE APP		
Yes	28	68.30%
No	13	37.10%

The technology acceptance of the LINE app

The questionnaire construct is divided into "cognitive usefulness", "cognitive ease of use", "use attitude" and "use will" totally four major aspects consisting of 17 questions. Overall, the elderly had the best "attitude" for LINE APP communication software, with the highest rating averaging 4.07 points on four constructs, followed by an average of 4 points on "cognitive usefulness". The socres of "cognitive ease of use" and "willingness to use" scores were equal which are an average score of 3.86. It can be interpreted that (1) the elders thought that the LINE APP as an excellent communication tool for them; (2) they found the software is useful (3) it was convenient for them to communicate. However, it was necessary to additionally assist and explain the certain functions such as the options. It would play a great role in the "willingness to use".

I think it is useful to communicate through the LINE APP communication software (4.1), and to use the voice communication function (4) for a score of 4 or above. (4.02), C1 "I think it is wise to use the LINE APP communication software" (4.07), D2 "I think this tool is worth promoting" and D3 "I am willing to Recommend this tool to friends and family to use "average score is 4.05 points. There were six items in the "percentage" of the distribution, with "consent" and "very much agree". More than 60% of the total, respectively, were "using the LINE APP communication software to meet my mobile communication needs" (63.4%). (65.9%), B1 "LINE APP communication software is very easy to operate" (63.4%), B2 "LINE APP to graphic display of each function project, so that the use of operation (65.9%), B4 "Limitation of using LINE APP will be less than traditional SMS, 61% of mobile phone calls", and B6 "Communicate through LINE APP, I think it is simpler than traditional mobile phones" (63.4%). Can explain the majority of the elderly that LINE APP in the use of communication is very useful for them, and the ease of use on the operation can have a certain understanding. This means that the elders have some acceptable usability for LINE APP acceptance (Table 2).

The impact of different attributes on four dimensions of LINE APP technology acceptance

(t = 2.51, p <0.05), which indicated that the educational level of LINE APP was significantly different (P <0.05), which indicated that there were significant differences in LINE APP between different educational backgrounds The willingness of the use of the difference in the higher level of education for the elderly have a higher LINE APP use. Other attributes were not statistically significant (Table 3).

Table 2 - LINE APP Acceptance is used.

	Gender /M±SD		*t*	*p*
	Male	Female		
Variable	N=16	N=25		
LINE APP usefulness				
A1 Can quickly use voice calls	4.19±0.75	3.88±0.72	1.306	0.19
A2 Can easily, simply, and quickly upload messages	4.06±0.68	4±0.70	0.28	0.78
A3 Use social networking to share your current status	4.13±0.80	3.84±0.62	1.27	0.21
A4 This tool is able to meet my needs for mobile communications applications	4.13±0.71	3.84±0.62	1.34	0.18
A5LINE APP do communicate I think it is useful	4.31±0.60	3.96±0.53	1.95	0.05*
LINE APP ease to use				
B1 LINE APP is easy to operate	3.81±0.91	4±0.57	-0.73	0.47
B2 LINE APP	4±0.63	3.84±0.55	0.85	0.39
B3 This tool graphs each functional item to make it easier to understand the operation	3.75±0.85	3.88±0.6	-0.57	0.57
B4 Use of this tool is limited to less than traditional text messaging and mobile phone calls	3.94±0.92	4±0.70	-0.24	0.8
B5 Even without operating instructions or human guidance, you can quickly learn to operate this tool	3.44±0.96	3.72±0.73	-1.06	0.29
B6 Communicating through LINE APP is simpler than traditional SMS	4±0.73	3.84±0.62	0.74	0.45
LINE APP Willingness to use				
C1 I think using the LINE APP is a wise choice	4±0.89	4.12±0.52	-0.54	0.59
When using LINE inconvenience for				
D1 LINE APP in communicating with others there is my needs	3.81±0.91	4.04±0.61	-0.95	0.38
D2 I find this tool worthy of promotion	3.88±1.08	4.16±0.62	-1.06	0.29
D3 I would recommend to friends and family use this tool	3.94±1.06	4.12±0.60	-0.7	0.48
D4 If this tool charges, I still willing to use	2.81±0.98	3.64±0.95	-2.6	0.11
D5 I would like to use this APP interactive communication with others	3.88±1.08	3.96±0.67	-3.09	0.75

Table 3 - Effect of Different Structures on LINE APP Acceptability

Variable	LINE APP usefulness		LINE APP ease to use		LINE APP Willingness to use..		When using LINE inconvenience for me….	
	t/F	*p*	t/F	*p*	t/F	p	When using LINE inconvenience for me….	*p*
Gender	1.5	0.14	-0.31	0.75	-0.54	0.59	-1.49	0.14
Age	2.51	0.74	2.21	0.96	0.9	0.44	0.94	0.43
Education	0.6	0.7	0.34	0.88	0.57	0.71	2.51	0.04*
Month Income(Home)	0.48	0.74	0.53	0.7	0.13	0.96	0.02	0.99
Use of traditional mobile phones and smartphone experience (time)	2.25	0.09	0.72	0.54	0.74	0.53	0.07	0.97
Do you know about LINE APP?	0.52	0.6	0.82	0.56	0.95	0.34	0.86	0.39

The elderly for the use of LINE APP troubled analysis

In the study of elderly people to use LINE APP during the troubled items are three items are "1.when passed chat messages too noisy", "2.For not familiar with, not more convenientto talk about." The first item "When passed chat messages too noisy" average score accounted for a maximum of 34.6 points; followed by the second item "For not familiar with, not More convenient to talk about. "Average score 3.41 points; the third item" Chat interface complex, do not know how to click "average score 3.39 points. If you get chat messages too noisy (46.3%), you get the "Consent" and "Strongly Agree" options from a distribution percentage of more than 40%. It can be explained that there are still some elderly people who think that the use of LINE APP for them, we chat when the message may cause their distress, (Table 4).

Table 4 - The use of LINE APP troubles

When using LINE inconvenience for me…. 3.42						
Questions	*M±SD*	Very disagree	Disagree	General	Agree	Very agree
1.When passed chat messages too noisy	3.46±0.97	2(4.9%)	4(9.8%)	12(29.3%)	19(46.3%)	4(9.8%)
2.For not familiar with, not more convenient to talk about.	3.41±0.89	2(4.9%)	1(2.4%)	20(48.8%)	14(34.1%)	4(9.8%)
3.Chat interface complex, do not know how to click	3.39±0.97	3(7.3%)	1(2.4%)	18(43.9%)	15(36.6%)	4(9.8%)

Discussion

From this study, the use of the LINE for the elderly to accept the degree is good, not only that this is a useful communication software, for them more feel is an easy to use tool. But in the use of the operation must still be someone to help guide the various buttons between the various functions, so to promote the elderly more convenient operation.

In Davis's (1989) theory of technology acceptance, cognitive usability tends to influence cognitive usability, and both factors directly influence attitudes toward use. In the present study, the elders had the highest ratings on the "attitude" of the LINE APP communication software, followed by the "cognitive usefulness" and the "ease of use" and the "willingness to use" scores. It can be explained that the elderly in the software that can be used for the software, but also in use that it is useful and easy to use, the relative will be willing to useThe higher the education level of the elderly for LINE APP have a higher use of will. So for the elderly in terms of LINE APP communication software is acceptable.

In addition, this study explores the use of LINE APP communication software for the elderly, showing that the use of communication software chat rooms of the message transmission is a higher problem for them; secondly, if you are unfamiliar with the people in the LINE APP communication software chat room chat is a bit embarrassing situation, do not know what to talk about? Finally, LINE APP communication software button complex, so that the elderly do not know how to press the button. From this it can be seen that if they further instruct the elders to confirm the accuracy of each step of their keys and to confirm their intention for each key, they can self-mute the voice of the message or reduce the sound, To complete. In addition to between the elderly in the LINE APP communication software chat room do not know what to talk about? If researchers are able to deliver a thematic message in this group, leading the elders to the topic, it may be possible for the elders to participate in the discussion.

Conclusions

This study is an experimental study, the technology acceptance questionnaire for data collection, for the elderly> 50-year-old home for the recipient to investigate the results, if you want to apply the results to other age levels of scientific and technological acceptance, has its inference limits. Suggested that the future can do the investigation of different age groups, in-depth understanding of different age groups for the use of communication software habits and recommendations.

References

[1] C.M. Perissinotto, I. Stijacic Cenzer, K.E. Covinsky, Loneliness in older persons: a predictor of functional decline and death, Arch. Intern. Med. 172 (2012) 1078–1083.

[2] J.Chopik. The Benefits of Social Technology Use Among Older Adults Are Mediated by Reduced Loneliness. Cyberpsychol Behav Soc Netw.(2016), 551-556.

[3] M. Luppa, T. Luck, S. Weyerer, H.-H. König, E. Brähler, S.G. Riedel-Heller, Prediction of institutionalization in the elderly. A systematic review, Age Ageing 39 (2010) 31–38.

[4] Y.R.R.Chen, and P.J.Schulz,The Effect of Information Communication Technology Interventions on Reducing Social Isolation in the Elderly: A Systematic Review . Journal of medical internet research.(2016) . 18(1) 1-18.

[5] K. Chen, and Alan H.S. Chan, A review of technology acceptance by older adults, *Gerontechnology* (2011), 1-12.

[6] T. Sims , A.E. Reed and D.C.Carr. Information and Communication Technology Use Is Related to Higher Well-Being Among the Oldest-Old. J Gerontol B Psychol Sci Soc Sci. (2016), pii: gbw130.

[7] F. D. Davis, R. P. Bagozzi, and P. R. Warshaw, "User acceptance of computer technology: A comparison of two theoretical models,"Management Science.(1989), 35(8) 982-1002.

[8] N.M. Suki and N.M. Suki, Exploring the relationship between perceived usefulness, perceived ease of use, perceived enjoyment, attitude and subscribers' intention towards using. 3G mobile services. Journal of Information Technology Management. (2011), 22(1), 1-7

[9] P.J. Hu, P.Y.K. Chau, O.R. Liu Sheng, and K.Y. Tam, "Examining the technology acceptance model using physician acceptance of telemedicine technology," Journal of Management Information Systems,(1999) 16(2),91–112.
[10] M. Igbaria, N. Zinatelli, P. Cragg, and A. Cavaye, "Personal computing acceptance factors in small firms: a structural equation model," MIS Quarterly, (1997), 21(3) 279-302.