

A Study on Healthcare Support e-Service Design for Senior Citizens

Yuan-Chu Hwang

Department of Information Management, National United University, Taiwan

Email: ychwang@nuu.edu.tw

Abstract—The urgent needs of healthcare assistant for elderly senior citizens increase rapidly. This paper presents an e-service design on stroke-precaution for senior citizens, followed by its implementation and evaluation. The healthcare support e-service design focuses on the aging problems including the degeneracy of memory and vision as well as the recession of attention. These physiological problems become the barriers for senior citizens to learn healthcare knowledge effectively. In order to help senior citizens to obtain appropriate knowledge for stroke-precaution, this study provides a healthcare support e-service and its interface design that specifically addresses the physiological issues for elderly.

In order to increase the accessibility of the healthcare support e-service, we utilize multimedia streaming technology and video clips to present stroke-precaution knowledge for elderly senior citizens. Different from traditional e-learning system provide massive information for user, this study provide a personalized e-service design which only provide related healthcare information according to user's health condition. The healthcare support e-service is designed for senior citizens that provide appropriate user interface addressing their situations. Analysis of learnability, perceived system performance, memorability and satisfactions are based on different ages and gender. Analytical result indicates our service design could help elderly to leap over the physiological problems they encountered. With the healthcare support e-service, life quality for elderly senior citizens and their families could be significantly improved.

Index Terms—e-Service Design, Healthcare Support e-Service (HSS), Elderly Senior Citizens, Stroke-Precaution

I. INTRODUCTION

Stroke is one of deadly illness in Taiwan. There are around 50 thousand stroke patients per year. The elderly population has increased to 10.4% of the Taiwan society. In order to improve the life quality for elderly, the urgent needs of healthy knowledge for elderly to prevent stroke should be take into consideration.

The lack of professional caring service for elderly is one of the most urgent problems. Usually, the elderly is not well take cared in their family. There are 17% of elderly could not get any help in time when they encounter emergent events. The institutional caring

service could provide many professional services for elderly. However, the institutional caring service is not available to all elderly owing to the cost is not affordable for every family. There should be alternative solutions to help elderly obtain necessary information to improve their life quality.

Adopting e-service and ICT (information and communication technologies) in healthy caring service is one of the solutions to broaden the knowledge channel for elderly. Due to the physiological recession from aging, traditional system design may not provide suitable assistant for elderly. There should be a service design that is specifically addressing on the problems that elderly encountered. In this study, a healthcare support e-service (denoted as HSS) design on stroke-precaution for elderly is proposed. The stroke-precaution HSS provides personalized healthcare information for elderly to learn and enrich their knowledge. The user interface design could help elderly to overcome the aging problems. The personalized recommendation service design could provide useful healthcare information for senior citizens. The provision of numerous multilingual video clips of stroke-precaution knowledge could support those illiterate senior citizens conquer the reading problem.

Remain sections of this paper are organized as follows. Section 2 presents the related guidelines for service design to elderly. Illustration of the stroke-precaution Healthcare Support e-Service (HSS) is presented in section 3. The evaluation methods and the analytical results are introduced in section 4. Finally, the conclusions and future research directions are presented in section 5.

II. SERVICE DESIGN GUIDELINES FOR ELDERLY

The service design guidelines for elderly can be unfolded into three parts. Firstly, the service needs for elderly senior citizens should be discovered. Secondly, some appropriate design guidelines for elderly senior citizens should be considered for providing the stroke-precaution HSS. Thirdly, the evaluation method of e-service design for elderly senior citizens will be discussed. In this section, these issues will be elaborated.

A. The Service Needs For Elderly

According to Morrell and Echt (1996), the comprehension ability of word, working memory and space recognition ability will decrease due to the aging issue. [12] Communicating with senior citizens with more

simple language, and provide assistant actively, these are few tips for helping elderly senior citizens to relieve their loadings. In order to provide service for elderly senior citizens, it is important that we consider that their physical conditions are declining.

There are two major issues for considering the service needs of elderly. The social issue and the knowledge issue. The social issue is the lack of labor power to take care the elderly. The knowledge issue is the lack of appropriate channel to obtain healthcare information and knowledge for elderly to take care themselves.

The family structure has changed due to the birthrate decrease. The whole society must face the challenges that the population of elderly has increased which raise the healthcare issue for elderly. In Taiwan, 65.2% of elderly suffer from a chronic ailment and require medical service periodically. Ministry of the interior report indicates that ideal living method for elderly is "to live with their children". Traditional culture in Taiwan also agrees that family should support and take care of their elderly. However, support and caring the elderly has becomes a burden for young families especially in the economy recession era. The precaution healthcare service for elderly could lower the loading for take care the elderly and improve the life quality for every family significantly.

The lack of suitable channel for senior citizens to obtain accurate healthcare knowledge is a vital problem nowadays. The healthcare support service for stroke-precaution requires professional medical knowledge that is not available for all elderly and their family members. Since the healthcare for elderly senior citizens requires family support, it is necessary for all family members to access proper stroke-precaution knowledge to provide support for their elderly.

Without the knowledge to identify the hazardous factors for stroke-precaution, it is very dangerous for elderly when they encountering the stroke crisis. Correct channel for elderly to gain healthcare information could benefit their knowledge as well as the general level of their health. However, the medical or healthcare knowledge may not available for elderly due to the incapability to access the suitable healthcare information sources. Even the internet and e-health service could provide much healthcare information for elderly; they are usually confused and might not able to identify which knowledge is suitable for them. This issue is obvious especially in the case that the healthcare information provides massive information for elderly that they cannot understand their true needs. Since most stroke patients are taking cared by their family, the stroke related healthcare knowledge should also be available for elderly as we as their family members to provide necessary support for the stroke patients.

B. E-Service Design Guidelines For Elderly

ICT-based e-service could become a convenient healthcare information channel for elderly, but the physiological recession issue may trouble elderly for using those ICT-based e-services. Previous studies indicate that usage of information technology is inverse proportion to user's age. [13, 14, 15] The visionary

recession will confuse elderly to accommodate to the rapid brightness change [5]. Elderly senior citizens are hardly to keep long-time concentration on specific subject [11]. They will become distracted owing to niggling details, which will slowdown learning and reduce the capability of information gathering [2, 6]. Previously study indicate that the short-term memory for senior citizens are not recession due to aging [9, 4], but senior citizens are difficult to process and recall memory especially on space and location subjects [3, 1]. Those issues will influence the utilization of ICT-based healthcare support e-service for elderly senior citizens, and worthy to pay attention on the possible solutions.

A Human Computer Interface (HCI) design should consider the perception of user and the communications between users [8]. Efficient service design is to diminish the communication gap to fulfill user's needs. Since 60% information system errors come from operational fault, proper instruction designs for user could eliminate the operational problems they encountered. These operational instructions for e-service designs are more important for senior citizens who may have learning disorder of the ability to read. Alternative information channel to provide necessary support for e-service operation could utilize all kinds of media elements including text, graphic, audio, animation and video [7]. The disorder to distinguishing colors may raise the difficulty for senior citizens to use traditional e-service interface and should be specific redesigned to fulfill their urgent needs.

Following are some interface design guidelines suggested from previous research, including layout design, readability design, and operation design. The design guidelines of layout design for senior citizens focus on diminishing the physiological recession to simplify the layout to help elderly concentrate on the provided information. For example, succinct layout design, proper length of the interface layout [10], centralized the layout of information provision. To improve the operational instruction for e-service design, it requires providing clear and consistent user interface for senior citizens to understand the meaning of each operation element. Large buttons are easy to comprehend the meaning of each element and is highly recommended.

For readability design, it is design to focus on how to decrease the difficulty for senior citizens to read the content of provided information from e-service platform. For example, Larger the font size and contrast the fonts to the background would help elder to identify the content. High-density content organization will interfere with reading fluency. Moreover, since senior citizens may not understand the usage of hyperlink, eliminate unnecessary hyperlink and replace text-link with graphic one will help elderly understand the interface [11]. Those suggestions will reduce the loading of memory for senior citizens and strengthen the wills-to- learn new things.

Besides the aging issue will influence the service design for senior citizens, the gender issue may also determine the use of ICT-based e-service. As mentioned in Kerschner and Hart (1984), male user have higher acceptance rate for new technologies than female user

[14]. In this study, we will propose a healthcare support e-service design that addressing the service need for senior citizens and we would like to evaluate whether different ages and gender will influence the usage of ICT-based healthcare support e-service.

Gender digital divide for senior citizens do exist, the definition of gender digital divide is to represent the gap of their ability and opportunity to use information technology between different genders. Gender digital divide may also influence the learning effect of senior citizens. According to Huyer and Sikoska (2003), female users do have less advantage in using ICTs and internet [18].

In Taiwan, the gender digital divide issue is reported by Research, Development and Evaluation Commission of Executive Yuan in 2008, the report items of gender digital divide for senior citizens can be unfolded into three parts, including the ICTs usage rate, Searching for healthcare information, and Using ICT course for learning.

For the ICTs usage rate, the giant gap exists especially for the senior female citizens. With the age increased, the gap also increased. The ICTs usage rate for female senior citizens is lower than male for the group of age 61 to 64 years old and the group of age above 65 years old. The female lagging indicator for the group of 61 to 64 years old is 15.9% lag behind, and 9.7% fail behind for the group above 65 years old. The internet usage rate for age 61 to 64 female users fail behind the male user up to 20.9%.

The gender gap exist for using ICTs for searching healthcare information, there are average 81.4% female users will search healthcare information through the internet, while the male user is left behind around 10%. This means female citizens care about the healthcare more than male users. Female citizens have urgent needs for the healthcare information than male users.

The gender digital divide exist in using ICTs course for learning. Female citizens have stronger wills and higher proportion that using ICT course for learning. Previous studies [16, 17] also provide similar outcome that female learn things more than male user, especially for the elderly senior citizens.



Figure 1. The user interface sketch of stroke-precaution HSS.

III. HEAHTHCARE SUPPORT E-SERVICIE DESIGN ON STROKE-PRECAUTION

The major issues of the healthcare support e-service design for senior citizens are the service function design and its user interface design. The service function design of the proposed stroke-precaution HSS can be unfolded into four key functions, including health status estimation, physical examination record, personalized multimedia stroke-precaution course materials, and achievement test. We will introduce the service functions in the following subsections. However, this paper emphasis on the user interface design for elderly since it is the foundations for elderly to utilize other service functions.

A. Stroke-precaution HSS Functions

We deployed the HSS on touch screen computers; user could interact with the HSS easily. The four function components of HSS on stroke-precaution are tightly connect with each other. A HSS system screen sketch is shown in Figure 1.

Physical examination record. The physical examination records are the fundamental healthcare information for the service system. User will get their physical examination records from hospital or other examination reports. User’s physical examination records provide necessary information for the Health status estimation function.

Health status estimation. This function is a computational function that gathering all the physical examination records or other information sources from elderly to provide the health status report. Various healths related factors and criteria are provided from doctor and specialist for establishing the computational mechanism. This function is connected to a recommendation service that generates the personalized healthcare course materials for their urgent needs.

Personalized healthcare course materials. In this study, ten categories of stroke-precaution healthcare knowledge that contains 82 multimedia video clips in three major languages in Taiwan. These healthcare course materials are stored in the multimedia database and connected with the streaming server. Elderly senior citizens could retrieve these course materials from internet or other

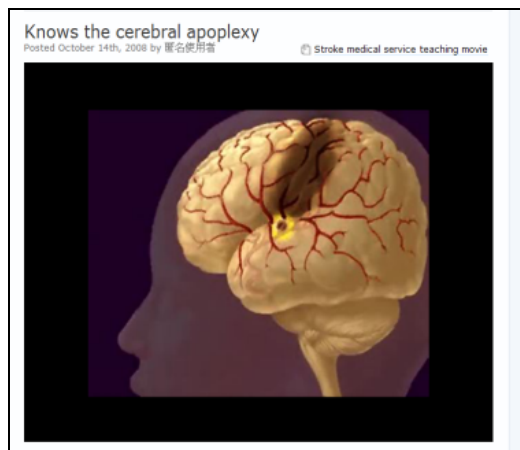


Figure 2. A sketch of course material in Stroke-precaution HSS.

service platform located in hospital. Benefit from the ICT, elderly could get personalized healthcare course materials based on their physical examination. A sketch of course material on stroke-precaution is shown as Figure 2.

Achievement test. Since the course material provided a channel for elderly to obtain personalized healthcare knowledge, it requires a mechanism to confirm the learning outcome. Achievement test provide the evaluation function for senior citizens to understand whether they can comprehends those stroke-precaution healthcare knowledge.

B. The Interface design for elderly

Owing to physiological recessions, elderly senior citizens may feel trouble to use e-services under traditional user interface design. Traditional user-interface layout design usually contains rich information for providing extensively choice for users. However, the senior citizens are not able to concentrate on specific target for a long time. They also have some trouble to get familiars with those fancy layout designs, instead, those dazzlingly designs may becomes the barrier for senior citizens to understand how to use the proper e-service functions. In short, the “simple” layout design would be more suitable for elderly senior citizens.

In this study, we redesign a service user interface for elderly senior citizens to operate the Stroke-precaution HSS. Some ICT features are utilized for providing intuitional operation instructions, such as the touch-screen, the voice-based instructions, etc. The significant features of our proposed design can be unfolded into two parts:

(1)Improving visionary recession problems. In order to present a comfortable service layout for elderly, our proposed interface are designed with 24 point large font and control the information within 110 words per page. Scrolling are not necessary in our interface designs, this will establish convenient reading and operating environment for elderly.

(2)Concentrating on the healthcare information. For the purpose to avoid senior citizens confused by irrelevant buttons, our design combines large and clear images with text descriptions of each button in the service system. Elderly senior citizens will get voice-based assistant in several major languages used in Taiwan.

C. Factors Considered in Stroke-precaution Healthcare Service

Personalized recommendation service on Stroke-precaution HSS is design considering the following factors. Those healthcare related factors can be classified as “Controllable factors” and “Uncontrollable factors”.

Controllable factors used in our Stroke-precaution HSS including their age, family historical records, races, gender, and previous medical records on apoplexy. Uncontrollable factors can be advanced classified into three subset. Uncontrollable disease related factors including hyperlipidemia, hypertension, cardiopathy, fatness, diabetes, and mental stress. Uncontrollable environment factor such as temperature difference will also influence the stroke-precaution. Habit factors such as

exercise insufficiency, smoking, drinking, and their food habit will be also considered in the service system.

IV. EVALUATION METHOD AND DATA ANALYSIS

A. Evaluation Process for Healthcare Service Design

The evaluation process is design to compare whether the Stroke-precaution HSS could help elderly obtain useful healthcare information. Our proposed Stroke-precaution HSS is compared with a traditional stroke healthcare information service platform, which is design on traditional interface layout. The research design is shown in Table 1. The evaluation matrix for healthcare support e-service design is presented in Figure 3. The evaluation process includes four steps.

Table 1. Research design of HSS Designs

	Experiment Treatments	Post-test
Experimental Group	Stroke-precaution healthcare support e-service for senior citizens	O ₁
Control Group	Traditional e-service designs on healthcare information system	O ₂

O₁, O₂: Questionnaire contains 12 items in four dimensions

Step 1. The introduction process to describe the service system to the elderly subjects. Elderly will be randomly assigned to either group.

Step 2. Elderly subjects are suggested to practice on using the assigned service system; researchers will observe whether elderly have trouble in using the service system.

Step 3. A task will be assigned for elderly to obtain healthcare knowledge related to his/her personal benefit.

Step 4. An evaluation questionnaire will be completed by subjects to estimate their perceptions.

The evaluation matrix is based on usability design of the e-service and could be unfolded into four dimensions. There are 12 questions included in the questionnaire. The validity analysis of the questionnaire is introduced in next subsection. Learnability represent whether the service interface could facilitate the usability for elderly. System performance is to determine whether the overall performance could fulfill user’s expectation. Memorability is design to measure whether the e-service interface is easy to use for elderly and could be memorized after a

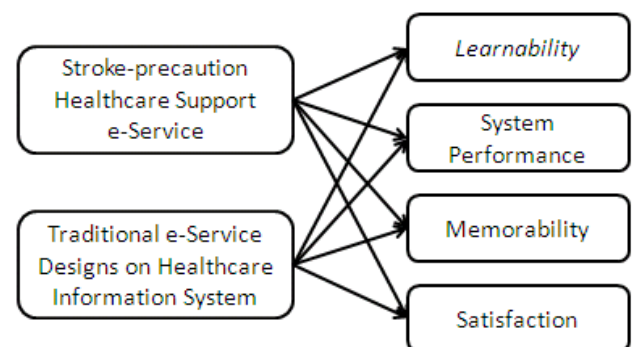


Figure 3. Evaluation matrix for healthcare service designs.

period. The satisfaction is for measuring whether the users satisfy the provided service through the healthcare service.

B. Subjects Discriptions

To understand the perceptions of the healthcare service design from elderly, the subject was selected according to definition from Ministry of the interior in Taiwan. Only aged over 55 years old was considered as the subject of this study. We ask for the subject randomly from the hospital and elderly communities, subjects were randomly assigned into different experiment groups. There are totally 57 subjects considered in this study, due to the missing data of one subject. The effect subject were 56 subjects. The subject descriptions is shown in Table 2 and 3. The experimental group was given the Stroke-precaution HSS, while the control group was given the traditional e-service design on healthcare service.

Table 2: The subject descriptions on gender

	Number of Subjects	Number of Subjects	%
Experimental Group	30	Male	21 37.50%
		Female	9 16.07%
Control Group	26	Male	13 23.21%
		Female	13 23.21%

Table 3. The subject descriptions on ages

	Subgroups	#	%
Experimental Group	Age 50~58	4	7.14%
	Age 59~66	7	12.50%
	Age 67~75	10	17.86%
	Age over 76	9	16.07%
Control Group	Age 50~58	10	17.86%
	Age 59~66	7	12.50%
	Age 67~75	5	8.93%
	Age over 76	4	7.14%

In this study, we would like to know whether the difference exist between different service designs, especially on the age and gender of senior citizens. The data analyses on four different factors are shown as following tables. Table 5 to 8 represents the data analysis between different ages of senior citizen subjects. Table 9 to 12 represents the difference between difference gender of senior citizen subjects.

Table 4. Summary of validity analysis

Dimension	Item number	questions	α
Learnability	1,2	2	.888
System performance	3,6,11,12	4	.917
Memoraility	4,5	2	.904
Satisfaction	7,8,9,10	4	.920
Overall		12	.970

To understand the creditability and stability of our measuring instrument, the validity analysis is shown as Table 4. The Cronbach's of the questionnaire is 0.970. As the four sub-dimensions, Cronbach's α of the four sub-dimensions are higher than 0.7. Overall speaking, the performance of the measuring instrument is acceptable.

C. Data Analysis Results on Different Ages

The data analysis result in Table 5 indicates that the learnability in our proposed Stroke-precaution HSS is not influenced by the ages of users. Various ages' elderly could facilitate the usability for elderly. Although there are not significant difference between experimental group and control group, but the overall evaluation on learnability in our Stroke-precaution HSS is higher than traditional service design.

Table 5. The difference of ages on Learnability

	Subgroups	Avg.	Std.	F
Experimental Group	Age 50~58	8.50	.577	.649
	Age 59~66	8.43	1.512	
	Age 67~75	9.00	.816	
	Age over 76	8.11	1.965	
Control Group	Age 50~58	5.70	2.058	1.642
	Age 59~66	4.71	1.799	
	Age 67~75	7.20	1.789	
	Age over 76	5.50	1.915	

Data analysis shown in Table 6 indicates that the perceived system performance in control group has significant difference (*P<.05) over different ages. This means that traditional service design could not fulfill all users' need especial those senior elderly. However, in our Stroke-precaution HSS, the age issue did not influence the overall performance. Based on the result, elderly senior citizens think the performance in our Stroke-precaution HSS is overall acceptable in all ages users.

Table 6. The difference of ages on perceived system performance

	Subgroups	Avg.	Std.	F
Experimental Group	Age 50~58	17.25	1.500	1.675
	Age 59~66	16.43	1.512	
	Age 67~75	17.80	1.989	
	Age over 76	16.00	2.062	
Control Group	Age 50~58	10.30	3.622	3.932*
	Age 59~66	10.00	3.512	
	Age 67~75	15.60	2.191	
	Age over 76	13.25	2.754	

*P<.05 ; ** P<.01 ; *** P<.001

Table 7. The difference of ages on memoraility

	Subgroups	Avg.	Std.	F
Experimental Group	Age 50~58	8.50	1.000	1.554
	Age 59~66	8.00	.816	
	Age 67~75	8.90	1.370	
	Age over 76	7.89	1.054	
Control Group	Age 50~58	4.60	1.776	5.451**
	Age 59~66	4.71	1.496	
	Age 67~75	7.80	1.095	
	Age over 76	6.50	1.915	

*P<.05 ; ** P<.01 ; *** P<.001

The measuring of whether the age of elderly in different healthcare service will influence the memoraility is shown in Table 7. Data analysis indicate the memoraility in control group has significant difference (*P<.01) over different ages. This means that traditional service design could not make elderly senior citizens in different ages to remember the usage of the interface design. Overall speaking, in our Stroke-

precaution HSS, the age issue did not influence memorability of elderly. Based on the result, elderly think the memorability in our Stroke-precaution HSS is acceptable in all ages. We can see the simple service design could make elderly concentrate on the target of the provision service, and elderly senior citizens could remember the operation and feel easy to use that service.

Table 8. The difference of ages on satisfaction

Subgroups		Avg.	Std.	F
Experimental Group	Age 50~58	18.00	1.826	.845
	Age 59~66	17.00	1.633	
	Age 67~75	18.20	1.751	
	Age over 76	17.33	1.658	
Control Group	Age 50~58	11.30	2.869	3.867*
	Age 59~66	11.14	2.968	
	Age 67~75	16.00	2.828	
	Age over 76	13.75	2.630	

* $P < .05$; ** $P < .01$; *** $P < .001$

Data analysis shown in Table 8 indicates that the user satisfaction in control group has significant difference (* $P < .05$) over different ages. This means that traditional service design could not satisfy the needs from elderly. However, in our Stroke-precaution HSS the age issue did not have significant influence between different ages. Based on the experiment result, elderly feel satisfied in our Stroke-precaution HSS for all different ages.

In general, the service design for elderly is quite different from traditional design paradigm. Due to physiological recessions, elderly are may encounter many problems when using traditional service design. Our proposed HSS is redesigned based on previous study for providing elderly useful healthcare knowledge on stroke precaution. The data analysis indicates that service design could bring elderly a better environment for them to obtain healthcare information.

D. Data Analysis Results on Different Gender

In the previous data analysis result, we found that our proposed Healthcare support e-service design could fulfill the actual needs of senior citizens. Senior citizens have better impressions on the service design that focus on their aging problems. In this subsection, we would like to analysis whether the outcome will be influenced by different gender of senior citizens. Following subsections will introduce the difference of gender on e-service learnability, system performance, memorability and satisfaction. The summarized data will presented in Table 9 to 12.

Table 9. The difference of gender on Learnability

Groups	Average	Standard Deviation	t	
Experimental Group	Male	8.67	1.528	0.802
	Female	8.22	.972	
Control Group	Male	5.85	1.951	0.386
	Female	5.54	2.106	

Comparing the data, we found the learnability of male users and female users are similar in each group. Both male and female users have better learnability in our proposed HSS design. The data analysis result in Table 9 indicates that the learnability in our proposed Stroke-

precaution HSS is not influenced by the gender of senior citizens significantly. However, even there are not significant difference between experimental group and control group, but we found the experimental group has better learnability than the control group. This means the learnability in our proposed Stroke-precaution HSS design could help senior citizens understand the operations than traditional service design.

Table 10. The difference of gender on perceived system performance

Groups	Average	Standard Deviation	t	
Experimental Group	Male	21	17.10	0.993
	Female	9	16.33	
Control Group	Male	11.69	3.660	0.000
	Female	11.69	4.070	

Data analysis shown in Table 10 indicates that the perceived system performance between experimental group and control group is not significant for senior citizens. Comparing the data we found that male users in experimental groups have much higher perceived system performance than others. The perceived system performance of Stroke-precaution HSS design is a higher than traditional service design for male user. For female users, traditional design has little advantages than the HSS design. In general, the design in our Stroke-precaution Healthcare Service did not influence the perceived system performance significantly for those senior citizen subjects in different gender.

Table 11. The difference of gender on memorability

Groups	Average	Standard Deviation	t	
Experimental Group	Male	8.43	1.326	0.902
	Female	8.11	.601	
Control Group	Male	5.62	2.142	0.192
	Female	5.46	1.941	

The measuring of whether the gender of elderly senior citizens in different HSS service design will influence the memorability is shown in Table 11. Data analysis indicates that there is no significant difference on the memorability in each group. This means the gender of elderly senior citizens did not influence them to remember the usage of the HSS interface. However, comparing the data of each group, we found our proposed HSS design has higher memorability than traditional design. Overall speaking the gender issue did not influence memorability of senior citizens in our Stroke-precaution HSS design. The memorability in Stroke-precaution HSS design is acceptable in both gender. We can see the "simple" service design could make elderly concentrate on the provided healthcare support e-service, and senior citizens could easy to remember the operation and feel easy to use that service.

Table 12. The difference of gender on satisfaction

Groups	Average	Standard Deviation	t	
Experimental Group	Male	17.71	1.848	0.450
	Female	17.44	1.333	
Control Group	Male	12.62	3.015	0.116
	Female	12.46	3.711	

Comparing the data, we found the male users and female users are similar satisfaction in each group. However, both male and female users have higher satisfaction in our proposed HSS design. Although the data analysis in Table 12 indicate the gender of senior citizens did not have significant difference in our proposed HSS design and traditional design. Even there are not significant difference between experimental group and control group, but we found both male and female users in experimental group have better satisfaction than the control group. This means the satisfaction in our proposed Stroke-precaution HSS design could make senior citizens feel better when operate healthcare services. Based on the experiment result, senior citizens feel satisfied in our Stroke-precaution Healthcare Service in all different gender.

V. CONCLUSIONS

Current healthcare service platform is rarely designed for elderly. Through continuous learning or participant in the social activities, a good healthcare support e-service would help elderly senior citizens keep a youthful body and healthy mental status. In order to provide a stroke-precaution healthcare support service for elderly senior citizens, this study combines ICT-based learning mechanism with personalized healthcare course materials and a friendly service interface addressing the recession issues of senior citizens. Doctors and specialists from hospital provided the course materials for our stroke-precaution HSS. The intuitive service interface design could help senior citizens access various healthcare knowledge for improving their health status. Analytical result indicates our service design could help elderly senior citizens to leap over the physiological problems they encountered. With stroke-precaution HSS, elderly senior citizens and their families could get better life quality.

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Yuan-Chu Hwang was born and grew up in Taiwan, R.O.C. Yuan-Chu Hwang received his Ph.D. from MIS Department of National Chengchi University in 2007.

Currently, he is an Assistant Professor of Information Management Department in National United University in Taiwan. His research and teaching interests include e-service innovation, ubiquitous commerce and privacy/trust issues for social mobile applications.

Dr. Hwang was the member of IEEE. He is also the international committee member of AICIT, and NCM, IICIT, IDC, IMS, NISS international conferences.