

## Positive UX and Active Use of ICT Devices among the Elderly

Ayako Hashizume\* and Masaaki kurosu\*\*

\* Faculty of System Design, Tokyo Metropolitan University

\*\* Center for ICT and Distance Education, the Open University of Japan

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### ABSTRACT

People have started to use ICT devices to achieve various goals in many situations. But a gap still exists between high end users and low end users that is related to their demographic group. One of the important traits is the generation or the age group. Authors conducted field research by the contextual inquiry method and analyzed the data by applying M-GTA, then summarized the information into a category relationship diagram. In this diagram, factors such as the motivation for using ICTs, active involvement in the communication and ICT literacy were regarded as three major components.

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### Corresponding Author:

Ayako Hashizume,  
Faculty of System Design,  
Tokyo Metropolitan University,  
6-6 Asahigaoka, Hino, Tokyo191-0065, JAPAN.  
Email: hashiya@sd.tmu.ac.jp

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## 1. INTRODUCTION

With the progress and the diffusion of ICT (Information and Communication Technology), many devices, such as PCs and mobile phones, have become more convenient and are used in various aspects of our life. At the same time, in Japan, the population is aging rapidly and since 2005 Japan has become the most aged society in the world. Japan's percentage of elderly persons (percentage of total population aged 65 and over) shot up from 5% in 1950, 7% in 1970, and 10% in 1985, to 23.1% in 2010, and is expected to rise to 30.5% in 2025 and 40.5% in 2050 [1]. Because of these factors, Japanese manufacturers in electronics have developed mobile phones and PCs for elderly users [2] [3], but a gap still exists between high end users and low end users depending on demographics. One of the marked differences is the difference between age groups. Whereas the progress of ICT adoption has been going smoothly upward recently, it was found that elderly people have a low rate of internet usage, for example, compared to young through middle-aged people as shown in Fig. 1. According to the Ministry of Internal Affairs and Communications, only about 70% of people of their late 60's and about 40% of their 70's are using ICT devices although more than 90% of people of their 20's through 40's are using them [4]. In other words, senior people do not use the ICTs actively compared to young people.

In our previous studies [5] [6], we conducted a questionnaire survey based on the quantitative approach to grasp the overall trend of using ICT devices. Answers to the questions showed some differences, for example that elderly people use less functions of ICT devices and they cannot operate functions that are widely known and used. It was found that elderly people do not use ICTs actively and effectively compared to young people.

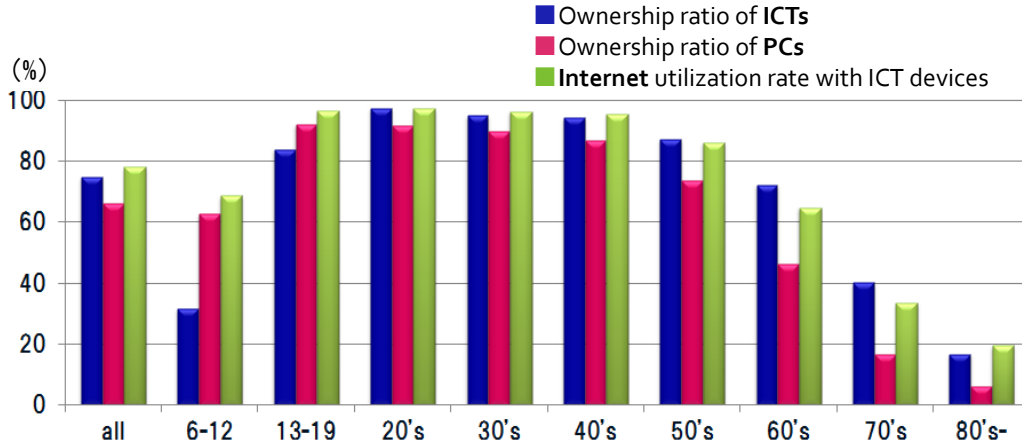


Figure 1. Usage ratio of ICT for each age group in Japan (2010) [2]

This study focuses on the reason for such differences in relation to value criteria among those people, in other words, how the design (appearance) and the usability are affecting the purchase of new mobile phone. In our other previous research [7], it was found that there are differences in the relative importance of value criteria depending on age and gender, and elderly people are not simply neglecting the design of devices (Kansei aspect) but are putting more emphasis on the ease of use (usability) and that they will regard the design as important if there are no usability problems.

Based on the conceptual analysis, Fig. 2 was described showing how changes in society may affect the life of elderly people. Because the lack of communication and the lack of information seemed to be two of the key negative aspects in the everyday life of elderly people, authors decided to focus on how they can use ICT-related devices and systems, especially mobile phones to decrease the negative aspects in their life.

As for the research method, authors adopted qualitative approach using the contextual inquiry method [8].

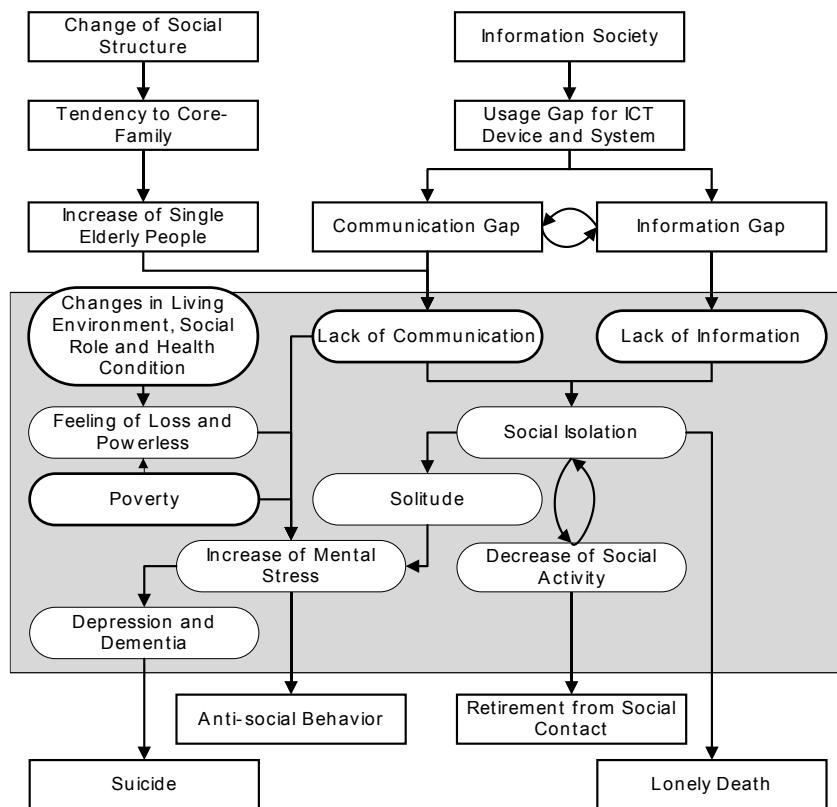


Figure 2. Changes in society and the life of elderly people

## 2. METHOD

The results of the questionnaire showed that there is a difference in ICT literacy depending on age, but it was not clear why and how there is such a difference between the two age groups. Hence we conducted interview research to identify the reasons. We adopted the qualitative approach using the contextual inquiry method and conducted the interview at informants' home or nearby places.

We visited the house of informants and spent total of 4 hours including 2 sessions for 2 hours. There were 36 participants in total including 16 young people and 20 elderly people (Tab. 1), half of them were living in the urban area and the other half were living in a rural area with an equal number of males and females.

Table 1. Participants

Generation	20's	60-70's
Male	8	10 (2)
Female	8	10 (2)
<b>Total</b>	<b>16</b>	<b>20 (4)</b>
Average age	25.25	69.26

※The numbers in parenthesis are those without ICTs.



Figure 3. Interviewing Informants at their houses

### 2.1. Questions

After a short introduction, we asked about the usage of ICTs and their individual information (life history, current life, social relationship, family membership, etc.). Research questions for the semi-structured interviews were as follows.

<Research questions about the use of the ICT devices >

- History of use,
- Actual use,
- Functions that they use,
- Differentiation of use among various functions and other devices,
- Contexts and situations of ICT usage,
- What they would do when they face with problems using ICT devices.

### 2.2. Analysis

For the analysis of data, we adopted the Modified Grounded Theory Approach (M-GTA), proposed by Kinoshita [9] [10] using the software (MaxQDA). It is based on the Grounded Theory Approach (GTA) originally proposed by Glaser and Strauss [11]. We conducted an analysis of all transcriptions of the interview using the M-GTA (Fig. 4, Fig. 5, and Fig. 6), and the results showed some differences in the use of the ICT devices between young people and elderly people.

<The M-GTA Processes>

- STEP 1: We generated key concepts from the verbal information obtained from each participant. Then, clarified those concepts by a purifying and integrating process. (Fig. 4).
- STEP 2: We reexamined the definitions and the names of concepts. We then refined and extracted the eventual concepts (Fig. 5).
- STEP 3: Then, we produced and extracted categories and grouped the concepts into different categories, and showed the relationships among them in the category relationship diagram (Fig. 6).

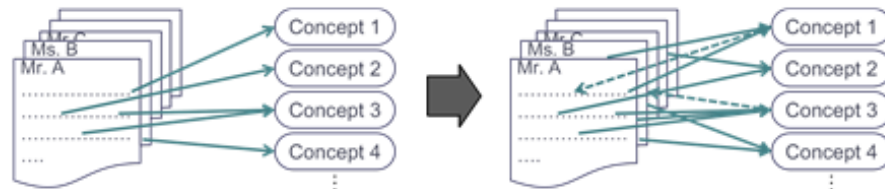


Figure 4. Analytical Procedure by M-GTA: STEP 1



Figure 5. Analytical Procedure by M-GTA: STEP 2

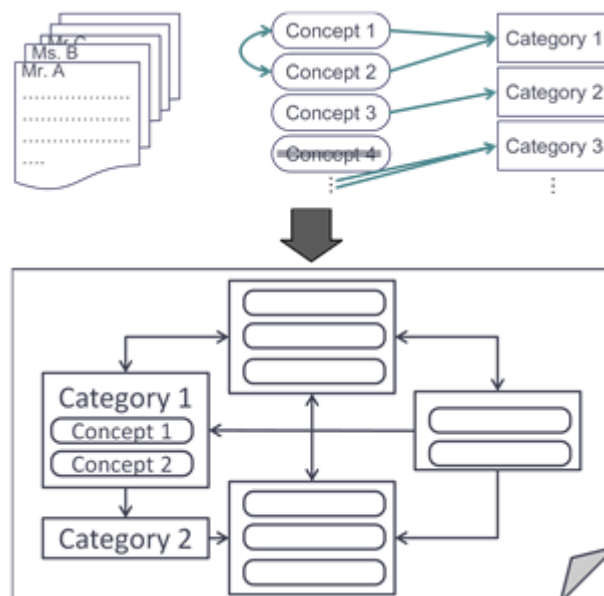


Figure 6. Analytical Procedure by M-GTA: STEP 3

**3. RESULTS**

The interview data was first transcribed and then analyzed using M-GTA. As a result of the M-GTA analysis, we produced and extracted concepts and finally we found 21 concepts from the data of elderly people, and put them into 8 categories (Tab. 2). In the same way, we took the youth concepts, putting 17 concepts into 7 categories (Tab. 3). Then, we drew the category relationship diagram as shown in Fig. 7.

Among them, there was a category “Emotional aspects of ICT usage” that was affected by the category “Experience using ICT” and affected to the categories “Motivation for the use of ICT” and “Active attitude to communication” In other words, a positive emotional experience played a key role for the active use of the ICT devices. Furthermore, the category “Emotional aspects of ICT usage” included concepts of Kansei (affective / hedonic) experiences, such as “Happiness and security experienced through usage” and “Realizing how convenient ICTs are” that can be classified as positive Kansei experiences, and another concept “Troubles during usage” is a negative one.

A strategy was thought to be effective by elderly people that aims to increase the level of literacy after having increased the motivation to use the ICT. It is especially important that the user experience (UX) of the ICT devices with positive emotions were based on the “Kansei experience” for elderly people.

Eventual Extracted Concepts		Categories
Active Attitude to Communication	A	Active Attitude to Communication
Width of Social Relationship	B	Fulfillment of Social Relationship
Depth of Social Relationship		
Financial Problem	C	Change in Living Environments and minds
Need for ICT		
Self-consciousness of Aging		
Retirement		
Opportunity of Social Support	D	Social Support for the Use of ICT
Active Use of Social Support		
Ability to Collect Relevant Information	E	ICT Literacy
Knowledge of ICT		
Problem Solving Ability		
Active Use	F	Motivation for the Use of ICT
Resignation of Use		
Interest in ICT		
Frequency of Use	G	Experience Using ICT
Length of Use		
Problem Solving Ability		
Realizing how Convenient ICT are	H	Emotional Aspects of ICT Usage
Happiness & Security Experienced through Usage		
Troubles during Usage		

Table 2. Concepts and Categories with Elderly

Eventual Extracted Concepts		Categories
Active Attitude to Communication	A	Active Attitude to Communication
Width of Social Relationship	B	Fulfillment of Social Relationship
Depth of Social Relationship		
Financial Problem	C	Change in Living Environments and minds
Need for ICT		
Awareness about the Effective Use of Time		
Ability to Collect Relevant Information		
Knowledge of ICT	E	: ICT Literacy
Problem Solving Ability		
Active Use		
Interest in ICT	F	Motivation for the Use of ICT
Frequency of Use		
Length of Use		
Problem Solving Ability	G	Experience Using ICT
Realizing how Convenient ICT are		
Happiness & Security Experienced through Usage		
Troubles during Usage	H	Emotional Aspects of ICT Usage

Table 3. Concepts and Categories with Youth

Therefore, it is important to increase the positive Kansei experience for the active use of the ICT devices among elderly people, and it will lead to a higher level of ICT literacy.

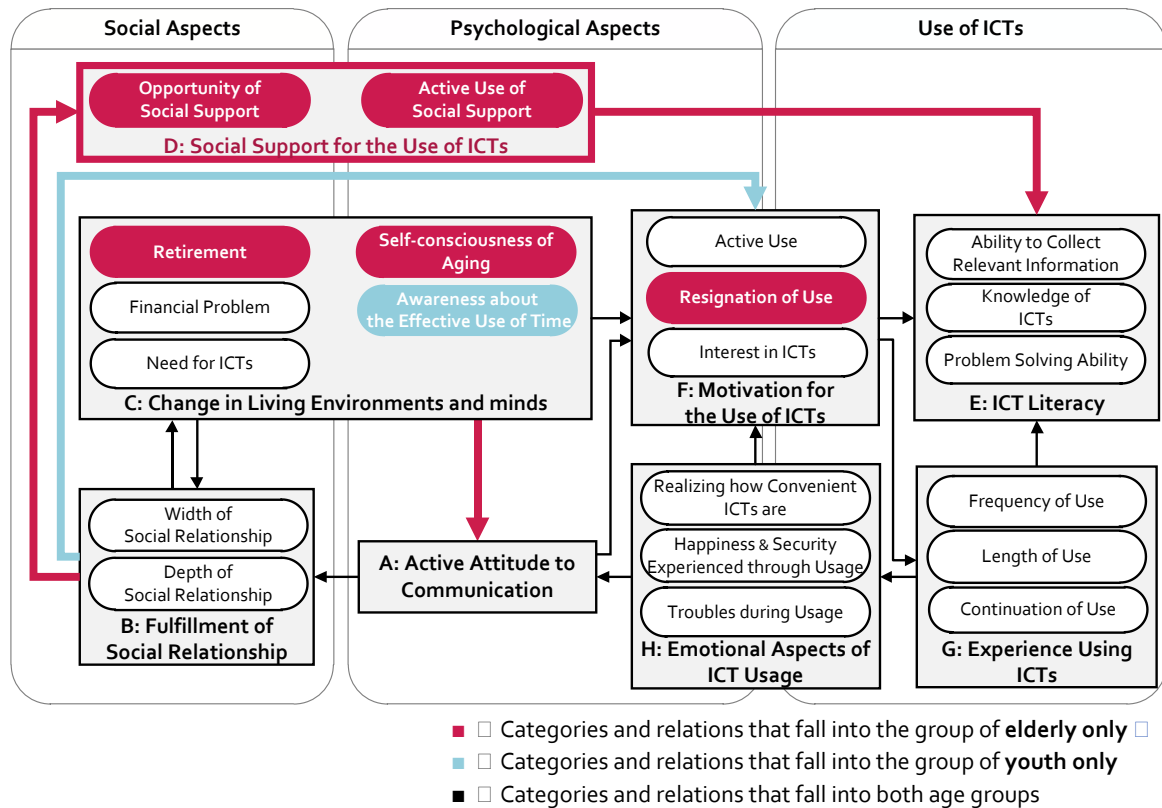


Figure 7. Category Relationship Diagram

#### 4. CONCLUSION

Findings based on the data analysis are as follows:

1. In order to increase ICT literacy among elderly people, motivation and real experience of usage are quite important.
2. If adequate social support is given to elderly people and the problem they may be facing could be solved, the ICT literacy will be increased.
3. Factors that facilitate the motivation to use ICT include an active attitude to the communication and positive Kansei experiences during the usage.
4. On the contrary, factors that demoralized the use of ICT include the change of life environment due to the retirement, the decrease in necessity of use of ICT, the decrease in motivation to actively communicate due to self-consciousness of aging, etc.
5. But if retirement is regarded positively as the attainment of freedom, elderly people are expected to have active motivation. And because they may have more free time than when they were working, their interest in the ICT can be increased.
6. Furthermore, changes in life situation and life consciousness will positively influence social relationships in general. This fulfillment of social relationships is related to the existence of opportunities to get social support and the acceptance of such support.

From the result of this study, it could be said that the improvement of the usability of devices is quite important especially for elderly users. But because there are individual differences regarding the literacy to use the ICT among elderly people, the user interface of the ICT devices should be optimal for both levels of people. In addition to the deliberate consideration of the usability, the design or the Kansei (hedonic) aspect should also be considered based on the fact that elderly people are not simply denying the Kansei aspect. In Japan, many ICT devices have been developed that target elderly people with the intention that the use of ICTs will be increased effectively and efficiently. These devices were developed considering

the physical characteristics of elderly people, but the usability as a whole has not yet fully been optimized in such devices.

It was found that it is difficult to answer “why” questions in the survey. By applying the qualitative approach, it is possible to understand the situational structure of the user and their context of use, and give a better understanding to the result of the quantitative approach. This approach will surely give the insight to the total design of high-tech devices such as mobile phones.

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Ayako Hashizume

She received a Ph.D. in Kansei Science from Tsukuba University, Japan, in 2011. Her research interests include psychology of emotion and Kansei, engineering in relation to HCD (Human Centered Design) and UX (User Experience), especially among elderly users. She was awarded the Kids Design Prospective Competition 2008 from the Japan Kids Design Association and the Best Design Prize at the Design Marathon 2009 from IAUD from the International Association for Universal Design.



Masaaki Kurosu

He is a professor at the Open University of Japan, since 2009. He is also a professor at the Graduate University for Advanced Studies as well as a President of HCD-Net (Human Centered Design Network). Based on his career as a usability professional in industry and academia, he proposed a concept of user engineering and is now proposing an ADA (Artifact Development Analysis) and a new concept of UX (User Experience).