STUDY ON DEVELOPING THE ASSISTING PROGRAM FOR CUSTOMIZED HOUSING DESIGN FOR THE ELDERLY

Junu HEO
Hongik University
Korea
pierre_vinci@naver.com

Jae Hee CHUNG
Hongik University
Korea
archijenny@gmail.com

Jong KIM
SEON ARCHITECTURE & ENGINEERING GROUP
Korea
78kjong@daum.net

Abstract: This study aims to develop an assistance program for the customized housing design for the elderly, which is based on the rapid growth of the elderly and the increasing needs for better residential environment aroused by economic development and growth in income level.

Today we are facing various problems resulted from rapid increase in worldwide the elderly. In 2026, Korea will enter a super-aged society, which means 20% of population will be the elderly. Aging phenomenon affects various industries quite a lot. It is also making big change in the elderly housing market too. The elderly are not simply weak and in financial need any more. Now they have high marketability and new value. The elderly users tend to participate actively in designing the house.

In designing housing, bidirectional communication between users and architect is essential. For this, users must have certain amount of knowledge in architecture and need to express their requirements clearly. However, there are communication problems resulted from the lack of architectural knowledge.

Therefore, this study sets its goal to develop the assisting program for customized housing design for the elderly through harmonious communication with the elderly, the future key users in the industry. For this, literature review related to the elderly, interview, and user survey were conducted. Additionally, in-depth interview targeting the elderly and architects was conducted to compensate the defect.

Based on this research, for the basic knowledge of architecture of the elderly users, a learning model needs to be developed considering physical, psychological, and social characteristics of the elderly, and a learning model suitable to the characteristics of the groups needs to be proceeded. Also, the methods of participation and communication need to be developed through proper combination of "design" and "selection for menu and option". In conclusion, this study suggests the direction of future research for developing assisting program by the combination of the way of learning and communication.

Through this study, it is possible to increase the quality of the elderly housing. Also harmonious communication with architects through the assisting program will raise the user satisfaction. In the future, the assisting program proposed in this study will be developed to be applied to real users.

Keywords: the elderly, assisting program, customized housing, education, communication

INTRODUCTION

Our society is facing diverse problems in varying degrees owing to rapid increase in the elderly. Problems deriving from such demographic change had constantly been placed at the center of discussion since the 20th century, and Korea is no exception, with the elderly taking up 13.1% of the national population in 2015. This figure directly implies that Korean society has entered Aging society; being the 2nd fastest pace towards such tendency in the world. At this rate, Korean society will have stepped into what we call 'super-aging society', with the elderly rate rising to 20% of the entire demographic (Asia-Pacific economic status report-adapting to the changing world). This social phenomenon is presenting itself with a huge influence in various industries, which can be most observed in developed countries. It is influencing growth in health, education, finance, real-estate loan, leisure, telecommunication, and petroleum chemistry industry. Thus, it is required to change the conventional views on the elderly as weak and helpless, and adopt a new perspective to consider them as social

[1] This research was financially supported by the Ministry of Education (MOE) and National Research Foundation of Korea(NRF) through the Human Resource Training Project for Regional Innovation. (No. 2015064357)

group with remarkable marketability, and new values. With such change in aspect, various studies about the elderly have been conducted.

According to Lee and Lee (2015), changes in behavioral/life pattern has been observed since Korea's entrance into aging society, and the elderly presents themselves with more economic/physical independency with stronger sense of autonomy. Another study by Lee and all (2001), with continuous economic development and growth in income level, the desire for improvement of living quality has increased, and the users select the sites actively and participate in housing design to realize their desires. The elderly, however, in architectural design, requires more attention due to their unique psychological, physical, and social characteristics when designing their living spaces. In planning a living space that would precisely meet the user's needs, mutual communication is imperative method that is not sufficiently met with the elderly due to their lack of knowledge in architecture and physical difficulties. Therefore, for residential design for the elderly, it is required that the users themselves to be equipped with certain degree of architectural knowledge and education in order to deliver their needs to the architects.

SCOPE AND METHODS

This study intends to develop an assistance program for customized housing design for the elderly, which will be done by attaining an in-depth understanding of particularities of physical, psychological, social characteristics of the elderly by reviewing advanced researches regarding the elderly, selecting pedagogical & communicational methods that would best serve in developing architectural knowledge for the elderly, and reinforcing theoretical background by interviews with both architects and the elderly.

Designing a customized housing for the elderly requires adequate communication tools and methods between the residents and the architect, and a learning model through reviewing the characteristics of the elderly.

The detailed procedure of the study is as follows:

First, through literature review, selection of learning method & communication method based on the analysis of the characteristics of the elderly is conducted.

Second, preferred communication method and learning method is analyzed through user survey and interview with the elderly and the architects.

Third, adequate architectural learning model and communications method and tools are selected by classifying the characteristics of the elderly based on literary review, interview and survey.

Forth, a direction for an assistance program for customized housing design for the elderly are suggested based on the results above.

LITERATURE REVIEW

Defining the elderly and analysis of its pedagogical characteristics

Kang(1990) defines the elderly by 'those individuals who are comparatively incapable of leading a normal life due to apparent aging in both psychological and physical aspects, though the degree might differ amongst individuals'. Also, advanced studies state that they do present a set of distinguished characteristics that separates them from other demographical groups in terms of physical, psychological and social perspective; all of which are generally perceived as to be 'inferior'. Physical wise, they have limitations of movement, longtime education due to their declining height, weight, bones, muscle, intestines and respiratory capacity. Psychology wise, they suffer from loss of urge for learning new things, declined active problem solving capacity, loss of confidence and passion, and depression due to sentiment, attachment, reminiscence, dependency, emotional rigidity and introverted personality. Also, in social aspect, their changes in social status and roles, declined economic and intellectual capacity, change in lifestyle, relocation of habitat, they face related outcomes such as decreased chance of information acquisition, declined radius of activity and increased leisure time, and changes in interacting social classes.

Shin(2007) claims that it is not enough that we base the education of our the elderly on demographical statistics and socioeconomic traits, and will have to take into account their value, consumption, leisure and other in-depth understanding of their subjective and cultural tastes, along with a pedagogical method that differs from other demographical groups. In Korea, education for the elderly are conducted at class for the elderly, the elderly welfare center, life-long educational centers with university affiliation and religious centers; however, current status is hard to get a grasp with not even accurate statistics regarding the issue is provided(Lee, 2015)

There exists however a social bias that is represented simply by the phrase 'old dogs can't learn new tricks', saying that the elderlies are incapable of learning or adopting new skills or knowledge. Such bias derives from other set of prejudices that in the process of aging they are thought to lose their creativity, learning capacity and intelligence; however, such prejudices have proven time and again by advanced studies to have been a socially

constructed bias.

Hwang(2009) suggests that increase of the elderly with high educational background means that we could assume that the elderlies now possess capacities to develop professional knowledge in diverse fields. This implies that the elderly could attain professional knowledge on architecture. The growing level of educational attainment of the elderlies along with the rise of income level stated by Lee ad all(2001), and changes in behavioral patterns to a rather more active and autonomous one pointed out by Lee(2015)-all these changes leads to the elderly's tendency to actively trying to improve the quality of their living condition.

Studies regarding the learning capacity of the elderly mostly reach to an agreement at one point; that the interpretation of conclusion of respective studies are to be carefully done, for it requires great level of sophistication to attribute one's learning capacity to one's age. Here it is important that we distinguish 'learning capacity' from 'academic achievement'. Single most important factor in the education of the elderly is time, since it requires a certain amount of time for them to effectively absorb the materials and concepts they have learned, rather than short time memorization-and-exercise. Though the elderly might do poorly in terms of academic achievement when put to learning at latter situation, their outcome (information recall) is shown to be far better when given a rather long length of time. Thus, we could observe that in discussing the learning capacity of the elderly, the point is not whether they have successfully stored the information, but the condition of recalling the already stored information. Time has great impact on successful call-back of information, and for the elderly, it is absolutely vital that they are given enough time to fully search, regenerate, replay, react to the information they had just stored; when this is done, education for the elderly would face less difficulties. Thus we must recognize that changing the educational conditions and environment is the vital task that lies ahead of us, and that we should provide other types of teaching methods or environments than we do to students from other demographic backgrounds. Also, we must encourage the elderly students to form their own educational environment and conditions.

Analysis of communication model for designing customized detached residences

A construction project is usually order-made, which begins with order from user or proprietor, and involves participation of user, resident, designer, constructor, in varying degrees (Cho and all, 2006).

In case of detached residences, contrary to the supplier-oriented, multi-unit residences, the resident takes part in the designing process with great enthusiasm in order to fulfill his/her needs and desires (Lee and all, 1999). Therefore, in this case, the resident' role and his/her architectural knowledge are important, and the communication with the architect has greater impacts.

Joost van Andel(1997) emphasizes the importance of user-oriented designs for a new building or remodeling of the crucial parts. This means that during the design process by an architect, it is vital that the future residents, the users, express their demands as detailed as possible. In addition, Kim(2006) also points out that the users should fulfill their role to ensure the project to end successfully. It is general, however, that the users face difficulties in playing their part due to the lack of architectural knowledge.

Designing a detached residence is usually composed of composition/width/deployment of chambers, section and level component (Heo, 2015); the user is not necessarily required to be aware of all these procedures to a professional level, and would suffice to be equipped with adequate level of knowledge that would be required for a smooth communication with the architect. Also, the architect needs to understand the user's characteristics and reflect it to the design in order to design a residential space (ibid). For accomplishing such task, the architect utilizes his/her own knowledge to interpret the general characteristics of the user to design space, or reflect the demands and needs of the user through interview or letter.

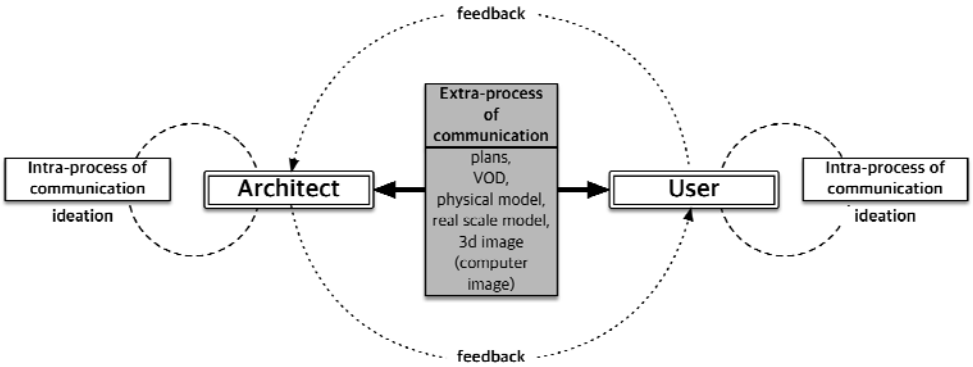

Figure 1. Communication(User-Architect)

Kalay(2004) defined 'communication' as the process by which the provider of the information transmits the information to the receiver. She distinguished the types of communications into intra-process of communication and extra-process of communication.

Intra-process of communication(IPC), also known as "ideation", refers to the process by which the architect makes descriptions through media(ex: sketch), based on which the design will be developed.

Extra-process of communication(EPC) refers to the process where the idea is shared with the user via media(plan, model, 3D image), where opinions are adjusted. In the case of EPC, it is the other party who interprets the results expressed through the media. Therefore, it is common that the result is misled, or not be interpreted at all. Design communication is even more limited when the end-result is expressed through a more simplified form (Hong and Yoo, 2014).

Cuff(1996) suggested that most of the users or users fail to fully comprehend the architect's sketch or model, and arbitrarily interprets the suggested media descriptions based on their experiences or knowledge. Hong and Yoo(2014) also pointed out that in a cooperation design between different professional parties, use of rendering images or blueprints have apparent limitations in delivering user's complex actions that takes place in 3 dimensional space, and that design ideas can successfully developed only through active mutual communications<figure 1>.

FINDINGS

Learning based on characteristics of the elderly

According to the aforementioned analysis, the elderly has some distinguishing characteristics that separate them from other demographic groups. This study have classified those characteristics into physical, psychological, social characteristics, and analyzed their impact on learning capabilities.

Physical characteristics change as height/weight and BSA declines, and as respiratory system, kidney, blood circulation, digestion system, and nervous system starts to fail, with changes in postures as well. Also, decrease in learning capacity and cognitive ability is observed in nervous system that has to greatest impact on learning capability. Therefore, alternative method of learning is demanded for education for the elderly, such as online-education or visiting-education that does not require the elderlies to leave their residence due to their limitations in movement, or short-time learning composition due to limitations in course duration time caused by decreased cognitive ability & learning capability

In psychological aspect, changes in their emotions show loss of passion and liveliness, confidence. Depression commonly takes place as well. Attachments to familiar object increase, while refusing new lifestyle patterns, which again leads to dependency and introverted personality. Therefore, individual goals for leaning are important for continuous progress and advancement. In the case of online-education however, it is rejected by the elderlies who are born usually around '50-'60, who has difficulties adapting themselves to smartphones and computers.

Socially, they are usually met with loss of social status, decreased role in the family hood, changes in the social classes they interact with, loss of spouse. Loss of economic capacity, decrease in range of activity, increased leisure time, migration due to decrease of family member is also common; of which changes in interacting social classes, increase of leisure time and weakened economic capacity would have impact on the learning aspect. Therefore, online-education that is economically less-burdening could be selected as the adequate education method. There is however a study that suggests a classic-learning method would turn out to be more adequate in case when they devote much of his/her time for aged-communities; thus it is important that we select learning model that would fit individual traits<table 1>.

Table 1. The elderly classification results

Type	Item & Factor scores	Cronbach's α
pursuit of happiness through self-development	4-0.888, 24-0.853, 17-0.853, 11-0.809, 8-0.715, 21-0.676, 15-0.668, 29-0.625, 28-0.606, 26-0.511	0.943
future oriented lifestyle	10-0.850, 23-0.771, 27-0.669, 30-0.666, 16-0.645, 3-0.582	0.847
anachronistic	5-9.829, 25-0.825, 12-0.770, 2-0.513, 32-0.401	0.768
knowledge pursuing	14-0.841, 31-0.732, 13-0.632, 1-0.598	0.743
socially active	7-0.752, 19-0.602, 6-0.550, 9-0.481	0.642

In conclusion, a survey had been conducted in order to classify the elderly into different groups in accordance to their specific traits; a modified version of VALS test was put to use as a way to classify the characteristics of the elderly. VALS stands for Value and LifeStyle, is a model developed at SRI International, California for defining co-relationships between consumer characteristics in the 70' U.S. Using this model provides the researchers with consumer types and traits, by assessment of demographical characteristics and the result of the survey, which takes place before the assessment procedure. This study had modified the VALS model in accordance to particularities observed in Korea, and conducted with 32 questions.

Distribution of the survey was done via a web-service called the Survey Monkey, and had surveyed the elderlies over 60; 85 questionnaire had been used for analysis, which were randomly distributed through email and internet communities with high average age. Coding was conducted after verifying the adequateness of the collected data, which was done using SPSS for Window 18.0. Factor Analysis was used for the analysis method, which lead to 5 groups and factor loading.<table 1>.

Group 1 turned out to prefer trying out something new, challenging, pursuing exotic and new things, and to have high desire to lead a happy life. Also, the cronbach's α is 0.943, explaining 21% of the entire variance. Hence in this study we will name them as 'pursuit of happiness through self-development' type. This group had high desire for learning in general, preferred a conventional type of learning to an online lecture, and was willing to actively reflect their opinions and voices in designing their residence.

In the case of group 2, we were able to observe that they enjoy making things for themselves, and are interested in hardware and machines. The cronbach's α is 0.847, which explains 10% of the variance. Hence in the study we shall name them as 'future oriented lifestyle' group. This group is capable of using computers, prefers online lecture, and is willing to actively engage in residence designing as did group 1.

Group 3 are particularly religious, and think that the television these days have too much sexual contents. Cronbach's α is 0.768, explaining 9% of the entire variance. The study will classify them as 'anachronistic' group. This group had less interest in education, and showed far less engagement when designing their residence.

Group 4 is intellectually active, who are interested in theoretical discussions and consider themselves as to be intellectual. Cronbach's α was 0.743, which explained 7% of the entire variance. The study have classified them as 'knowledge pursuing' group. This group had the highest desire for education. But their preference between two types of classes were hard to distinguish, and were passive in making plans for their resident.

Group 5 liked being the head of a group, and had tendency to trying to lead others. Cronbach's α was 0.642, which explained 5% of the entire variance. This study named group 5 as 'socially active' group. They showed similar patterns regarding education with group 1, but preferred conventional method of education to its online counterpart.

Communication for designing a customized housing

There would be various ways for describing a space, but the point is that they are for communication regarding spatial information. Especially, in communication process that arises between an architect and a user, space description realizes in concrete form what only exists in the architect's imagination through conceptual and cognitive ways. There exist many preventive methods that aim to minimize the loss of information during the process. Text, plan, section, concept, diagram, table, charts are methods that belongs to conceptual description, whereas model, real-scale-model, computer image, VOD(video on display) belongs to cognitive description method.

During the interview with the elderly and architects, the elderly had low level of space comprehension with conceptual description methods; whereas with real-scale-model showed the highest level of understanding, followed by VOD. We could also observe how the elderly have tendency to describe a space in accordance to their experiences, and requires comparison with already-existing experience to fully comprehend a new space.

The following chart shows the pros and cons of respective participation methods.<table 2>.

Table 2. respective participation methods

Methods	strengths	weaknesses
Design method	Customized designing enabled in accordance to the characteristics and traits of the resident	Communication between the architect and the user is vital, which requires the user to be equipped with certain degree of architectural knowledge
Selection method for menu and option	Residential space that would correspond to the characteristics of the resident could be selected based on statistics and architectural planning	Less customizable compared to design method, and has limitations in selection due to limited number of options
DIY method	The space could be designed fully for the resident due to his/her active participation in design process	Requires high-level of architectural knowledge and skills, with high rate of faults due to construction by un-skilled labor
Variable module method	The space is open to modification due to its initial openness to variables	Cannot fully reflect the residents needs in detail due to limitation in modification

User participation in residence design aims to reflect the main demands of the users to designing procedure. There are several ways by which this is done; Cooperative method where the user takes part in every procedure of the design and construction, from planning to management, Design method where the structure is designed by the architect whereas the interior is mainly designed by or cooperation of the user, Selection method for menu and option where the user selects from several blueprints, or selects composition, finish or part of the facility, DIY method where the user takes over from the construction phase, and the Variable module method where the user takes part in a certain degree in construction and utilization phase.

Unlike other demographic groups, in designing detached residence, the elderly have difficulties actual participation due to their characteristics which are usually limitations of various sorts. Therefore, the participation method for the elderly in designing a customized detached residence for the elderly, will have to be composed of design method, Selection for menu and option and variable module method.

Therefore, in selecting the necessary communication method for developing a user participation method that is aforementioned, we have conducted an interview of 5 the elderly and 3 architects. The former, are composed of those who are willing to construct a detached residential space for preparing their later-life. The interview was oriented in a way that it would give us an idea if they are aware of how they would deliver their requirements to the architects or if they have any architectural knowledge at all. The latter party are experienced group of architects who have accomplished numerous building projects and are still active(Seongjin-Baek, Mija-Lee, Jinkyu-Park). We have asked in detail of the communication method between the user and the architect, means used for communication, and their emphasis when they design a customized detached residence for the elderly.

The result of the interview revealed the following: the elderly prefer design method, but selected Selection method for menu and option considering their economic and timely aspect. Also, in the process of communication, they had tendency to make a spatial description in based on their experience when they visibly confirm a space, and had low understanding of sketch, 3D rendering image and blueprints.

As for the architects, they assume that the selection for menu and option would be much more convenient for both the user and themselves, and that design method comparatively requires more time and economic resources. They stated however, that through design method they would be able to reflect the characteristics of the users more than any other methods, and that the end-result would be closer to what we would call ‘customized’. In cases when the user lacks in architectural knowledge, the communication between both parties are more opt to suffer difficulties, which would result in unclear delivery of the requirements of the users to the architect and to dissatisfaction on the end-result.

Furthermore, it is difficult for an architect to understand the user’s demands when smooth communication fails. Therefore, architects usually explain the project with their portfolios, and depend on their intuitions to understand the characteristics and requirements of their users.

In conclusion, we have induced the following during the process of our interview: the communication method for customized detached residence for the elderlies is to allow indirect experience of space-composition of the residence via video or scaled-down models, by combining design method, selection for menu and option. Also, grasping the characteristics of the user should be supported by a more quantitative frame or a program, instead of current practice of relying on the architects intuitions.

CONCLUSIONS

This study aims to develop an assistance program for the design of the customized residential for the elderly, which is based on the rapid growth of the elderly, and the increasing needs for better residential environment aroused by economic development and growth in income level.

This study found that the elderly require special methods of communication and education in comparison to other demographic groups. Also, according to the survey and interviews with the elderly and the architects, the more trouble with the communication between the two parties, the lesser the user satisfaction turned out to be. This results from the lack of architectural knowledge of the users, and of the efficient means of communication.

This study was conducted through the literature review, user survey, and interviews. Then, the elderly were classified into 5 groups in accordance to their physical, psychological, and social characteristics, and the educational models corresponding to each group were illustrated. Also, the communication method and tool for residential design for the elderly were selected. Therefore, the assistance program for designing customized housing for the elderly would employ the following procedure & components<figure 2>.

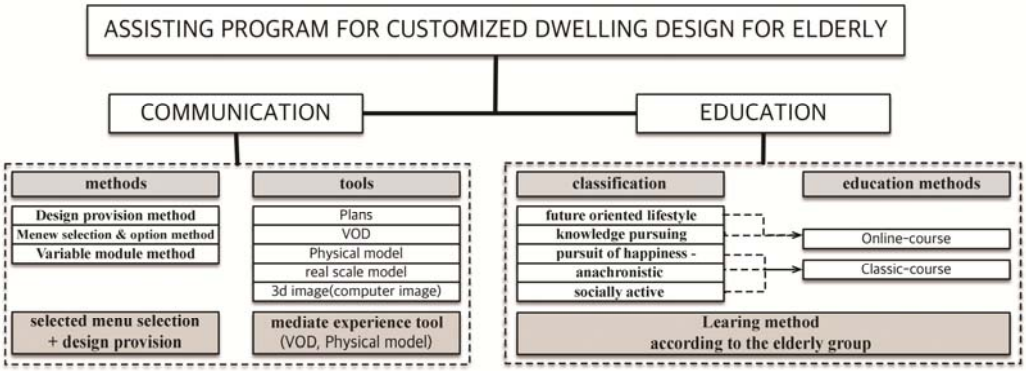

Figure 2. Construction of assisting program for customized housing design for the elderly

Lastly, the following conclusion can be drawn out to develop an assistance program for the customized housing design for the elderly.

1) Communication method is to be formed by the combination of design method and selection method for menu and option. First, the user should be able to choose the designed residential space via selection for menu and option, and it should be provided after re-design by the architect.

2) Communication tool is to maximize the utilization of the VOD in order to provide indirect experience of the residential space. It has been shown that elderlies are incapable of sufficiently recognizing and understanding a space with mere 2D images. Therefore, use of VOD is necessary to ensure that they have a rich understanding of the space via indirect experience; using physical model alongside with the VOD would make the whole process even more efficient.

3) In composing a learning method for the elderly, it is vital that we have understanding of individual characteristics of the elderlies, and select the corresponding learning method. Therefore, this study classified the elder people into 5 groups, and assigned them with online-course/classic-course.

4) Lastly, for a customized residence design for the elderly, it is imperative that the user's needs be reflected in the project by quantifying their requirements. Therefore, a program that is able to grasp one's characteristics in statistical, psychological aspect should be used, and user's requirements are to be able to be chosen or composed by the program as well.

The following <figure. 3> shows the overall results of the above, which configures the assisting program as the flow chart..

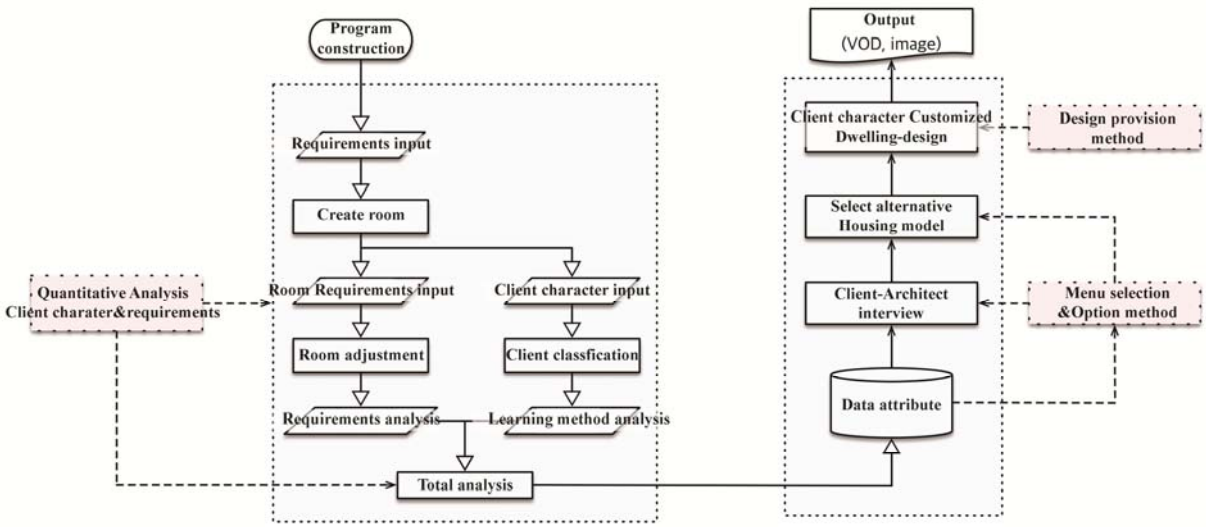

Figure 2. Assisting program flow chart for customized housing design for the elderly

It is expected that such a research process would be able to support a smooth communication between the users and the architect in development of the customized housing for the elderly. Also, the user satisfaction of the residential space would be improved drastically if the user themselves acquire a certain degree of architectural knowledge and actively engage in the designing process.

REFERENCES

Cho, Su-Kyung, Shin, Chang-Hyun, Lee, Jea-Sauk & Chun jae-Youl(2006). Systematic Plan for Requirements Definition of Building Projects(pp.633-636). Architectural Institute of Korea Vol.26 No.1

Chun, Jae-Youl & Oh, Seung-Jun(2003). Constitutional Directions of Decision Support System for Cooperative Design in Architectural Design Phase(pp.91-98). Korea Journal of Construction Engineering and Management Vol.4 No.2

Han, Jung-Ran, Park, Seong-hie, Won, Young-Hee & Choi, Li-Seon(2011). The Present Situation and Policy Suggestions on Older Adults Education in Korea(pp.121-149). Interdisciplinary Journal of Adult & Continuing Education Vol.14 No.1

Heo, Junu(2016). Parametric based, User-Customized Automatic Generative Housing Model System Realization – Focused on the detached house for older users. Hongik University

Hong, Seung-Wan & Yoo, Chang-Geun(2014). The Applications of Online, Multi-User Virtual Environments for Architectural & Interior Design Communication(pp.41-50). Journal of the Korean Housing Association Vol.25 No.1

Hwang, Young-Hee(2009). The History of Elderly Education in Germany and Its Implications for Korea(pp.201-221). Korean Journal of 21 Century Social Welfare Vol.6

Joo, Young-Sook(1999). A Study on the Elderly Education in Korea(pp.51-78). Duksung Women's University Education laboratory Vol.7

Kim, Dae-Won & Choi, Moo-Hyuck(2006). A Study on the Interactive Virtual Model House to Increase Communication of Space Information(pp.159-164). Architectural Institute of Korea Vol.2 No.1

Kim, Duk-Su & Koo, Jae-Hee(2008). Knowledge Producers and Users' Perception to the Significance of Silver-Town Design Elements(pp.109-118). Architectural Institute of Korea Vol.24 No.11

Kim, Hye-Sook(2009). The Understanding of Architecture Concepts and Their Implications for Built Environment Education(pp.119-143). Art Education Review Vol.33

Kim, Jin-Han(2007). Changing of Paradigm of Educational Gerontology for Successful Aging on the Aging Society(pp.1-24). Interdisciplinary Journal of Adult & Continuing Education Vol.10 No.4

Kim, Ju-Hyung(2006). An Approach to Facilitate Knowledge Streams of Building Industry Users – A Theoretical Background and a Basic Study on the Feasibility of Implementation(pp.135-143). Architectural Institute of Korea Vol.22 No.4

Kim, Kyung-Hyun & Lee, Jah-Young(2004). A Study of Application Method of Web-Based Instruction: Elderly Education(pp.1-37). Interdisciplinary Journal of Adult & Continuing Education Vol.7 No.3

Kim, Mi-Ran & Lee, Kyung-Hoon(2008). A survey on the Perception of Important Factors in Designing Apartment Housing for Elderly(pp.27-35). Journal of the Architectural Institute of Korea Planning & Design Vol.24 No.9

Kim, Young-Il(2003). On the Study of the Type of the Knowledge-Use in the Architectural Design Process(pp.87-94). Architectural Institute of Korea Vol.19 No.8

Lee, Dong-Min & Lee, Ji-Yeon(2015). The Elicitation of design service direction based on the core needs of seniors – Based on qualitative study of UXD(pp.297-305). Korea Design Knowledge Journal Vol.34
Lee, Hyun-jeong, Park, Sun-kyung, Kim, Kap-tae & Ha, Jae-myung (1999). A Case Study on the Idyllic Housing Design with User Participation and Post-Occupational Alternation – Focused on the A Idyllic Housing Estate near Taegu(pp.139-144). Architectural Institute of Korea Vol.19 No.2
Lee, Young-Jun(2015). Developing Educational and Cultural Contents for Highly – educated Senior Citizens(pp.167-196). Academic association of global cultural contents
Park, Eung-Hee(2009). A Study on the Aged Learners to Analyze the Education Market for the Aged – Centering on the Busan Metropolitan City(pp.137-158). Journal of Lifelong Education Vol.15 No.3
Park, Seong-Hee(2003). Biographical Learning as Lifelong Education(pp.29-57). Interdisciplinary Journal of Adult & Continuing Education Vol.6 No.1

