

# Chatty Bot: An Alternative to Implement a Memory Training Option for the Upcoming Older Adults in Indonesia

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# 1 Chatty Bot: An Alternative to Implement a Memory Training Option for the Upcoming Older Adults in Indonesia

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**Abstract.** Indonesia, the world's fourth most populous nation, is an aging country. The significant demographic changes force this middle-income developing country to prepare for the new society. We proposed chatbot usage as a new medium for the baby-boomers to interact. This cohort will or already enter their retirement age soon. We argue this technology suitable due to familiarity with the usage. This research uses quasi-experimental research in the form of within-subject measurement implemented to the people older than 55 years old and user of cross-platform messaging service with simple memory training. A chatbot prototype called Chatty Bot was developed to learn the participants' ability to detect the features given. Chatty Bot has proven acceptable for its system's usability and predicted to still be used by the majority of the participants for at least one month. The simple chatbot technology recommended enhances the effective communication channel, related but not limited only to healthy aging.

**Keywords:** Chatbot · Communication channel · Elderly · Memory training

## 1 Introduction

Indonesia, the world's fourth most populous nation, is an aging country. The significant demographic changes, together with the shift of technology, social, economic, and other life aspects [1], reshape the world's future and enforce this middle-income developing country to prepare the new society. Even though the attribute to communicate rapidly takes new forms, but the people itself gradually changing. People still live day by day, and the purpose of socializing, interacting, respect, or communicate has hardly changed for

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decades. However, the debate of using digital technologies or digital games to communicate with family members may result in the elderly feeling stressed, ignored, emotionally excluded, and motivationally impeded [2] supposed not to be ignored. Hence, feasibility of the elderly readiness to use the specific communication technology independently, also the critical component to proposed design as the elderly now is the generation of baby boomers which familiar with a visual display (i.e., Television) and touch screen smartphone [3] with the implementation of capacitive touch screen.

This study is a part of ongoing research related to changing elderly behavior toward a physically active lifestyle, which has already proven lower than the other comparison communities, and demand continuous companionship for their physical activities [4]. Nevertheless, in our recent studies, we found out that the communication pattern between the elderly and the younger generation have tendencies to lean towards dominant figure. Fortunately, both family leaders use the same communication medium: smartphones—especially for the elderly from the baby boomer generation and their children. Nevertheless, the interaction of the next generation elderly with their smartphone for Indonesian communities never been explored before.

The importance of this study is to learn the ability of the participants to detect the features given in chatbot deployed on their familiar cross-platform messaging apps, which arguably more comfortable for them to operate because of no need of downloading the application as well as the familiarity with responding to the notification given by the cross-over platform messaging. In details, this research will focus on four following aspects to evaluate the proposed design:

1. The participants' consistencies in using chatbot correlate with given notification.
2. The participants' ability to do the training sessions in three types of memory training (recall, mnemonic, detail).
3. The participants' motivation to contribute to the next training if they get personal feedback on their performance.
4. The usability of the system using System Usability Scale (SUS).

The result will become the recommendation of suitable technological based design to enhance the effective communication channel to provide beneficial interaction, related but not limited only to healthy aging.

## 2 Cognitive Declining, Motivation, and Next Generation Elderly

Old age will have significant implications and directly associated with physical and mental disturbances and reduce plasticity and brain size. Normally occurred in most people, not all declining processes and acceleration are considered normal. Reviews on observational studies show that cognitive training, physical activities, leisure activities, and dietary factors might be protected from or decreased to 18% risk of cognitive decline [5]. Despite the content to prevent cognitive decline, an intrinsic motivation from the elderly, arguably significant for successful changes in their programmed training and changing their behavior. The feasibility of the proposed design in this research also takes into account the concept of Cattell's Crystallized Intelligence ( $G_c$ ) which related to wisdom,

including the ability to view a problem from multiple perspectives and the possibility to maintain [6, 7]—instead of the utopian ideal of enhancing this type of intelligence through education. Baby boomers are the term for people born between 1946–1964 with the distinctive characteristics for being hard-working, prefer to manage, loyal, balance work and family, formal to authority, confident, and comparatively more aware of health-conscious than generations precede them. This generation tends to like being involved in their health care decisions and treat them more like the younger population [8, 9]. The ability to learn the electrical-based technology embedded with their lifestyle, as they were born and grew up with the usage of telephone and television, and in their productive age when email usage gradually changed the postal mail. Not to mention, once people are familiar with technology or interface, they often do not switch to promise better performance [10]. Therefore, the barrier of using the latest technology is a qualitative issue that differs from one society to others. Feasibility of shifting media communication into adopting specific technology to keep up with the world associated with internet adoption will increase social engagement, create positive behavioral change, improve psychological well-being, and strengthen the learning confidence of the elderly [11]. The term Behavioral intervention technologies (BITs) already implemented as the unique ways of using various media (e.g., internet intervention, mobile apps, video games, and chatbot) as an acceptable innovation channel, emphasize on social-oriented interaction style [12, 13].

### 3 Methodology

#### 3.1 Method

This study is following User-Centered Design (UCD) methodology [14], which has an iterative process as follows:

1. Specify the usage context. The limitation of this study is for baby-boomers smartphone user. The increase of user from the middle to late boomers is more than 2.5 times higher [15] in Indonesia, indicating internet usage are rapidly increasing for the late Indonesian boomers.
2. Specify requirements. In this study, we conduct the experiments using the arguably common for smartphone users: Cross Platform messaging service integrate with chatbot. A chatbot or conversational assistant is a computer program that allows humans to interact with technology using a variety of input methods and widely known in recent years to use in a customer service environment to support marketing and another service area with the use of natural language [16]. In this study, the positive action will appear in the form of memory training activities, divided into three types of training: Recalling, Mnemonic [17, 18], and details.
3. Produce design solution. Chatbot prototype in this study was deployed in LINE and Telegram, with the support of Engati (<https://www.engati.com/>) as the chatbot platform integrate with LINE account manager (<https://manager.line.biz/>).
4. Evaluation. Evaluation of this study will use the back-translated SUS with its cut of points 68 out of 100 (<https://www.usability.gov/how-to-and-tools/methods/system-usability-scale.html>). Moreover, to understand the interaction, we also conducted a questionnaire for better explanation.

### 3.2 Sampling Structures

The study adopted quasi-experimental research in between and within-subject measurement implemented to the people older than 55 years old. All of the participants should be Indonesian adults, with prior experience in interacting with the designated cross-platform messaging service (Telegram or LINE), and willing to give their informed consent by filling the inform consent voluntarily. Participants will eventually drop out if they cannot finish any level of the training in a chatbot, they cannot manage their smartphone to open the directed link to the training (linked to google forms) and finish the end questionnaire.

### 3.3 Procedures

The experiments took 16 days, including one day for early notification about the starting date of the experiment, 14 days of training, and one day to fill the end questionnaire. The recruitment was done purposively by the researcher and snowballs by the recruited participants. Chatty Bot Experiment Procedures are presented in Table 1. Chatty Bot Experiment Procedure.

**Table 1.** Chatty bot experiment procedure

Day	Timeline	Description
Day 0	Recruitment	Recruiting participants according to inclusion criteria
	Briefing	Brief of what should participants done
Day 1–14	Start experiment	
	08.00 AM	First broadcast to add chat bot + greetings new user (in chatbot)
	08.10 AM	Bio reminds (10 min after automatic/manual greetings LINE/Telegram)
	08.00 AM (day 2–14)	Broadcast Encouragement/Leaderboards of previous training
	12.01 PM–12.02 PM	Broadcast Greetings+ Load Training Option (all option/ greetings returning user)
	12.01–17.01 PM	Independent training
	17.00 PM	Broadcast the specific training path
Day 15	20.00 PM – night	Researcher check the new submission level from the participants
	08.00 AM	Broadcast the instruction to fill the final questionnaire
	All day	Participants fill the final questionnaire
	18.00 PM–22.00 PM	Researcher check the submission Researcher count the eligible participants to get the token of appreciation + share it

### 3.4 Design Solution: Chatty Bot

This study using Chatty Bot as the prototype design. Overall, the prototype deployed in LINE and Telegram identical features. However, since each platform contains a different configuration, there are some adjustments in how the participants can access and respond. Chatty bot has three main paths and smart response to interact with the participants: (1) Welcome new user (contains the greeting for the new user, explanation about general chatting topic, and collecting participants biodata). In this path, if the participants needed further explanation about the experiments, then Chatty Bot will be able to explain with the function optional conversation. Nevertheless, if the participants already willing to continue to the next step and become returning user, they will have shortened path of conversation with Chatty Bot. For this path, Engati were used for both Telegram and LINE bot; (2) Greet returning users, contains re-greetings of the participants who already open the Chatty Bot for the second time or more. The participants will be provided with three training types (Recall, Mnemonic, and Eye of Details); and (3) Smart response/Auto-response message. The function of these features is as the response of pre-scheduled conversation (in the form of encouraging/leaderboards, load training, and suggested training).

## 4 Results

### 4.1 Participants

Between December 3rd to 18th, 2020, 22 people (6 men, 16 women) participated in this study. The platform is divided into LINE (1 man, 11 women) and Telegram (5 men, five women). However, two participants (2 women, both using LINE) were dropped due to personal and technical reasons. Participant's age range was 55 to 76 years old (average: 60.48 years old). Two participants were retirees, and the other 18 participants still active working. All of the participants live in an urban area (Bandung and Jakarta) in Java Island and able to do basic activities of daily living (BADL).

### 4.2 Findings

This study using Chatty Bot as the prototype design. Overall, the prototype deployed in LINE and Telegram identical features. However, since each platform have different configuration, there are some adjustments in how the participants can access and respond. Comparison between two deployed system mention in Fig. 1 and 2.

According to the aim of the study, Chatty Bot has proven its usability, however we would like to mention several recommendations based on findings: (1) Estimating the level provided and frequently update or add the new session, so the participants were continuously able to keep up with their performance without having re-done the duplicating session; (2) As more practice might not resulting in a better result, it is better for the designer to make every session worth doing, challenging but not frustrating; (3) Specifically provided sessions still preferable by most of the participants. However, the baseline cognitive capacity of every participant is different from one another. If it is possible, then test the water for measuring the participant's condition before choosing the real training



**Fig. 1.** Telegram – LINE interface: (e.g. Placement for 1<sup>st</sup> Level. Fruits, Prototype statement and user path

option is beneficial; (4) The first-time experience in using the chatbot arguably gives the highest impact. Therefore, messages for the new user should be meticulously selected; (5) The urgencies of notification came in different degrees. Since the notification cannot be re-activated, then the notification given time should be explored more to the most likely suitable for most participants; (6) Notification frequencies need to reduce to avoid the overlapping notification; (7) Motivational words similar to leaderboards effectively motivate participants. However, the content should not discourage (for not ever mentioned in the leaderboards) or duplicating (chatbot become 'less' human). Thus, focusing to participant's contribution more effective than mentioning other's achievement; (8) A lot of missed training session by participants needs to be taken seriously; (9) Two direct manipulation modes of input (typing and press button both are affordable for the participants. However, different types of language keyboards might become an issue when the chatbot is deployed on a larger scale; and (10) Participants' experience in perceiving the level name based on the number is also should reconsider, as the number is directly perceived as the level of difficulties for what it is inside.



**Fig. 2.** Telegram– LINE interfaces: Drop down vs Rich Messages, Rich Button and Card Based Messages

## 5 Discussion and Conclusion

### 5.1 Discussion

Smartphone usage inevitably already shifted from mobile phones into a multimedia gadget. These phenomena show that the participants and their cohort are ready to interact

independently with their smartphones. Human ability has ways to adapt to the system. Nonetheless, recognizable cues from the device purposely will make effortless interaction [19] in the relation between human-computer interaction.

The habit of using a cross-platform messaging service as a regular communication channel enables the chatbot to switch its function from customer service to health assistant. No matter what kind of messaging service platform, as long as the user is already familiar with the messaging service concept, then using LINE and Telegram as the second-choice platform still results as applicable system for using the chatbot training platform. Therefore, we argue that despite of the limitation of chatbot compare with the stand-alone application, which enables to customize based on the user expectation, chatbot still has an advantage for not to be installed in the first place. Without installing the application, chatbots will emerge in the user's every day and regular activities in the form of a new friend'. This advantage also underlines the low learning curve, as most users only acquire some base function and learn additional function on demand.

## 5.2 Conclusion

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In this study, we explore the use of chatbots as a feasible communication channel implemented for the next generation older adult in Indonesia. As a result of using the SUS inventory questionnaire (75.375), this prototype meets the standard usability score. Nevertheless, further technical details will be required for implementation on a larger scale. Cognitive capacity baseline, catching up with the smartphone usage frequencies, and how to 'package' the importance of doing these training in the first place, are the three most crucial aspects to be the focus on further development. Finally, chatbot as the tools is arguably suitable to act as independent communication media for the next generation elderly and potentially extended with broader thematic purposes.

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## References

1. Grazuleviciute-Vileniske, I., Seduikyte, L., Teixeira-Gomes, A., Mendes, A., Borodinecs, A., Buzinskaite, D.: Aging, living environment, and sustainability: what should be taken into account? *Sustainability* **12**, 1853 (2020)
2. Carvalho, J., Francisco, R., Relvas, A.P.: Family functioning and information and communication technologies: How do they relate? a literature review. *Comput. Hum. Behav.* **45**, 99–108 (2015)
3. Bhutta, Z.I., Sheikh, J.A., Yousaf, A.: Usage of mobile phones amongst elderly people in Pakistan. In: Rebelo, F., Soares, M. (eds.) AHFE 2017. AISC, vol. 588, pp. 621–630. Springer, Cham (2018). [https://doi.org/10.1007/978-3-319-60582-1\\_62](https://doi.org/10.1007/978-3-319-60582-1_62)
4. Wianto, E., Chen, C.-H., Defi, I.R., Sartika, E.M., Hangkawidjaja, A.D., Lin, Y.-C.: Understanding interactivity for the needs of the elderly's strength training at nursing home in Indonesia. In: DRS2020, Synergy, p. 1408. Design Research Society (2020)

5. Blondell, S.J., Hammersley-Mather, R., Veerman, J.L.: Does physical activity prevent cognitive decline and dementia?: a systematic review and meta-analysis of longitudinal studies. *BMC Public Health* **27**, 510 (2014)
6. Zaval, L., Li, Y., Johnson, E.J., Weber, E.U.: Complementary contributions of fluid and crystallized intelligence to decision making across the life span. In: Hess, T.M., Löckenhoff, C.E. (ed.) *Aging and Decision Making: Empirical and Applied Perspectives*, pp. 149–168. Elsevier Academic Press (2015)
7. Grossmann, I., Na, J., Varnum, M.E.W., Park, D.C., Kitayama, S., Nisbett, R.E.: Reasoning about social conflicts improves into old age. *Proc. Natl. Acad. Sci.* **107**, 7246 (2010)
8. Kahana, E., Kahana, B.: Baby boomers' expectations of health and medicine virtual mentor american medical association. *J. Ethics* **16**, 380–384 (2014)
9. Yu, H.C., Miller, P.: Leadership style: the X Generation and Baby Boomers compared in different cultural contexts. *Leadersh. Organ. Dev. J.* **26** (2005)
10. Grudin, J.: Three faces of human-computer interaction. *IEEE Ann. Hist. Comput.* **27**, 46–62 (2005)
11. Chiu, C.-J., Tasi, W.-C., Yang, W.-L., Guo, J.-L.: How to help older adults learn new technology? results from a multiple case research interviewing the internet technology instructors at the senior learning center. *Comput. Educ.* **129**, 61–70 (2019)
12. Stephens, T.N., Joerin, A., Rauws, M., Werk, L.N.: *TBM* **9**, 440–447 (2019)
13. Cicco, R.D., Silva, S.C.E., Alparone, F.R.: Millennials' attitude toward chatbots: an experimental study in a social relationship perspective. *Int. J. Retail Distrib. Manag.* **48**, 1212–1233 (2019)
14. Abras, C., Maloney-Krichmar, D., Preece, J.: User centered design. In: Bainbridge, W. (ed.) *Encyclopedia of Human-Computer Interaction*. Sage Publications, Thousand Oaks (2004)
15. *Responen Survei Nasional Penetrasi Pengguna Internet*. 2018. Asosiasi Penyelenggara Jasa Internet di Indonesia (2018)
16. Villegas-Ch, W., Arias-Navarrete, A., Palacios-Pacheco, X.: Proposal of an Architecture for the Integration of a Chatbot with Artificial Intelligence in a Smart Campus for the Improvement of Learning. *Sustainability* **12**, (2020)
17. Hill, R.D., J I Sheikh, J.Y.: The effect of mnemonic training on perceived recall confidence in the elderly. *Exp Aging Res* **13**, 185–188 (1987)
18. Vranić, A., Španić, A.M., Carretti, B., Borella, E.: The efficacy of a multifactorial memory training in older adults living in residential care settings. *Int Psychogeriatr* **11**, 1885–1897 (2013)
19. Dourish, P.: *Where the Action is: The Foundations of Embodied Interaction*. MIT Press (2004)

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