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A Study on Training Touch Panel Operation Using Gamification for the Elderly

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In recent years, as the elderly population has increased, digital technology has become more widespread, and touch panel devices have become an indispensable part of daily life. Smartphones and tablets have become important tools for supporting the lives of the elderly in a wide range of applications, such as communication, information gathering, and viewing photos and videos. However, it has been pointed out that touch panel devices are often more difficult for the elderly to operate than for younger generations.

Against this background, there is a need for support to help the elderly learn to use touch panel devices effectively, but research targeting the elderly is limited. In particular, while many existing studies have focused on touch screen operation practice and interface design for the younger generation, specific approaches to support touch screen operation learning for the elderly are lacking.

Furthermore, from the perspective of intrinsic motivation, the use of gamification has been attracting attention. Gamification is a method of introducing game elements into non-game contexts, and is expected to increase intrinsic motivation. For example, by utilizing a sense of accomplishment and a reward system, it can motivate users to continue working on the game. In previous studies, the effectiveness of gamification for the younger generation has been widely examined, and results have been shown in the fields of education and health promotion. However, there are few studies on gamification for the elderly, and there have been no sufficient studies on elements and designs suitable for the elderly.

When considering gamification elements suitable for the elderly, it is assumed that they have different needs from those of the younger generation. For example, while score competitions and ranking systems often contribute to motivation in the younger generation, the older generation tends to emphasize a sense of accomplishment and social interaction. It has also been shown that the elderly prefer simple and intuitive designs over complex systems with high cognitive load. Gamification design that takes these differences into account may be effective in helping the elderly learn to operate touchscreens.

In this study, we focused on the problem that the elderly have difficulty learning touch panel operation, and developed a touch panel operation learning system using gamification for the elderly to solve this problem and promote touch panel operation learning. To achieve this goal, we selected gamification for the elderly and for the general public, constructed a touch panel operation learning environment using gamification for the elderly and for the general public, and conducted experiments to demonstrate the usefulness of the developed touch panel operation learning system.

First, a survey of previous studies was conducted to select gamification, and a table summarizing gamification for the elderly and gamification for the general public that had been identified in previous studies was created. From the table, we selected the gamification to be applied to the touch panel operation learning system. In this study, the gamification for the elderly is developed using an animal metaphor, and the gamification for the general public is developed using a simple design.

Next, we developed an application for Android tablets using Unity to create an environment for learning touch panel operation. We developed four applications: a practice application using gamification for the elderly and a practice application using gamification for the general public for tapping and flicking, which are basic touch panel operations. In addition, two test applications were developed to measure the ability of tapping and flicking. We developed the gamification apps for the

general public and the gamification apps for the elderly so that there would be no significant differences in areas other than the gamification elements.

In order to achieve the objectives of the study, we conducted one 90-minute experiment each for two days with eight male and eight female subjects (mean age: 73.13 years, standard deviation: 5.56 years) in their 50s to 80s or older to practice mastering touch panel operation. The experiment consisted of a pre-test questionnaire, a pre-test of touch panel operation ability, touch panel operation practice, a post-test of touch panel operation ability, and a post-test questionnaire. In the pre-test questionnaire, subjects answered simple questions about their attributes and touch panel operation. In the pre-touch screen operation ability test, subjects were asked to perform taps or flicks for 30 seconds each, and the number of times and accuracy were measured to determine their ability. In the touch screen operation practice, eight subjects were divided into four groups of two each, and practiced to cover the tap and flick practice application using a gamification for the elderly and the tap and flick practice application using a gamification for the general public, respectively. The first 15 minutes was for general practice, and the second 15 minutes was for free practice. A post-practice questionnaire was used to evaluate the apps and intrinsic motivation. The evaluation of intrinsic motivation consisted of a questionnaire with a total of 12 questions, and was based on four indices of intrinsic motivation: interest and enjoyment (an accident-report measure of intrinsic motivation), perceived ability and perceived choice (positive predictors of self-report of intrinsic motivation and behavior), and pressure and tension (negative predictors of intrinsic motivation). (negative predictors of intrinsic motivation), and pressure/tension (negative predictors of intrinsic motivation).

Based on the results of the experiment, we examined significant differences between the groups of gamification for the elderly and for the general public using the Wilcoxon signed rank test of nonparametric tests on the data of gamification for the general public and for the elderly. The results showed that there was no significant difference in the change in ability before and after practice between the touch panel operation acquisition system using the developed animal metaphor for gamification for the elderly and the touch panel operation acquisition system using gamification for the general public. There were no significant differences in the evaluation of motivation in terms of interest/enjoyment, perceived ability, and perceived choices, but there were significant differences in pressure/tension. This indicates that gamification for the elderly has the potential to reduce tension more than gamification for the general public. In addition, when we focused on the results of the experiment in which the gamification for the elderly was introduced to subjects B1 and D1, who responded that tap-flick operation was difficult in the preliminary questionnaire, the mean scores increased before and after practice for both subjects. In addition, the variation in scores after practice was smaller than before practice, and the subjects were able to perform at a higher level of stability. This suggests that the practice session may have resulted in a uniformity of skill and stability of performance. Therefore, it is considered that the gamification for the elderly who find it difficult to operate the touch panel, which was the purpose of this study, was able to improve the touch panel operation skills of the elderly.