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A Study of Mobile Game Usability Evaluation Method

Chul-Kang Yoo[1], Jung Yoon Kim[2]*

Abstract

Usability serves as criteria for evaluation of efficient use and improvement of user interface performance. Such usability evaluations vary depending on purpose and use. This paper analyzed established research on usability evaluation method to assess usability of mobile game and presented new usability evaluation criteria. This paper selected three games per mobile game genres and conducted usability evaluation experiment for 60 subjects.

Keyword: Game, Usability, Game Usability, Mobile Game

1. Introduction

As wireless communication technology has developed and smart phone has disseminated widely, various kinds of mobile games have developed. According to sales by mobile game platform from 2013 until now, sales of mobile game in 2014 was 1,212,500 million won which was 51.4% higher than the last. A size of mobile game market in 2014 was 1,500,000 million won which was 8.2% higher than the last. It is expected that a size of mobile game market will be 1,700,000 million won in 2015. It is reported that 78% of 1,200 million users who have smart phone in the world have experienced mobile game]. Mobile game market has grown remarkably and many businesses have launched mobile game which meets customers' need. It is expected that mobile game market will grow more and more as lots of overseas investors and businesses have invested much money in Korea's mobile game market[1].

As competition among game companies become fiercer with the growing mobile games and game companies are concerned about failure after they launch game, usability evaluation becomes more important. Usability evaluation methods vary depending on purpose and use and there is no absolute evaluation method[2]. NIELSEN's heuristics evaluated usability of general desktop application. Korhonen, mobile HCI expert suggested heuristics by classifying module into mobile game usability, mobility and

1 Semyung Univ. Sinwol-dong, Jecheon-si, 579, Korea
e-mail : mychichi923@hanmail.net
2 School of Game, Chungkang College of Cultural Industries, 389-94 Chungkang gachang-ro, Majang-Myeon, Icheon-si, Gyeonggi-Do, Korea.
e-mail : kjyoon79@gmail.com (Corresponding author)

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game play. Desurvire, an playability expert suggested, heuristic by classifying items into game play, game usability, game story and game structure. The purpose of usability evaluation is to maximize efficiency and satisfaction.

This paper analyzed existing usability evaluation method and suggested new usability evaluation criteria for mobile game. This paper conducted usability evaluation for 60 subjects who are in their 10's, 20's and 30's.

2. Related Works

2.1 Heuristics evaluation method by Jacob Nielsen

There are ten principles according to Jakob Nielson[3] as advance research on usability evaluation method. Nielson established ten kinds of heuristics for general user interface design which mainly aims for desktop application usability and covers general user interface such as dialog box, return, rerun and error prevention. As the game has very sensitive and complex interface and leads a user to be immersed and entertains, it is necessary to develop proper heuristics which can be an equivalent in a game to game development. [Table 1] below shows 10 kinds of guidelines by Jakob Nielson.

[Table 1] Ten Usability Heuristics by Neilsen

N1	Visibility of System Status
N2	Match between system and the real world
N3	User control and freedom
N4	Consistency and standards
N5	Error prevention
N6	Recognition rather than recall
N7	Flexibility and efficiency of use
N8	Aesthetic and minimalist design
N9	Help users recognize, diagnose, and recover from errors
N10	Help and documentation

2.2 Heuristics evaluation method by Korhonen

In 2006, Korhonen[4] suggested heuristics according to modules -game usability, mobility and game

play. In 2007, Korhonen suggested heuristics that considered Player-to-Player interaction to evaluate mobile multi player game based on advance research.

[Table 2] below is heuristics for evaluating game usability which was suggested by Korhonen. He classified modules into game usability, mobility and game play in order to evaluate playability of mobile game.

[Table 2] Heuristics for Evaluating Mobile Game Usability by Korhonen

K1	Audio-Visual representation supports the game
K2	Screen layout is efficient and visually pleasing
K3	Device UI and game UI are used for their own purposes
K4	Indicators are visible
K5	The player understands the terminology
K6	Navigation is consistent, logical, and minimalist
K7	Control keys are consistent and follow standard conventions
K8	Game controls are convenient and flexible
K9	The game gives feedback on the player's actions
K10	The player cannot make irreversible errors
K11	The player does not have to memorize things unnecessarily
K12	The game contains help

2.3 Heuristics evaluation method by Desurvire

In 2008, Desurvire[5] made heuristics by items into game play, game usability, game story and game structure referring to Jacob Nielsen's heuristics and Korhonen's heuristics. [Table 3] is usability evaluation heuristics of GAP(Game Approachability Principles) suggested by Desurvire.

[Table 3] Heuristics for Evaluating Game Usability by Desurvire

D1	Provide immediate feedback for user actions
D2	The Player can easily turn the game off and on, and be able to save games in different states
D3	The Player experiences the user interface as consistent (in control, color, typography, and dialog design) but the game play is varied
D4	The Player should experience the menu as a part of the game
D5	Upon initially turning the game on the Player has enough information to get started to play.
D6	Players should be given context sensitive help while playing so that they do not get stuck or have to rely on a manual.
D7	Sounds from the game provide meaningful feedback or stir a particular emotion.

D8	Players do not need to use a manual to play game.
D9	The interface should be as non-intrusive to the Player as possible.
D10	Make the menu layers well-organized and minimalist to the extent the menu options are intuitive
D11	Get the player involved quickly and easily with tutorials and/or progressive or adjustable difficulty levels
D12	Art should be recognizable to player, and speak to its function.

3. Mobile Game Usability Evaluation

3.1 Suggestion of criteria for evaluating usability

This paper applied heuristics suggested by Jakob Nielson, Desurvire and Korhonen to evaluate usability which is suitable for mobile game as shown in [Table 4]. This paper suggested a new criteria for inquiring usability evaluation of mobile game according to genres by analyzing strength and weakness of three usability evaluation indicator - Nielson's heuristics (desktop application evaluation method), Korhonen's heuristics (mobile game usability, mobility, gameplay module) and Desurvire's heuristics (gameplay, game usability, game structure).

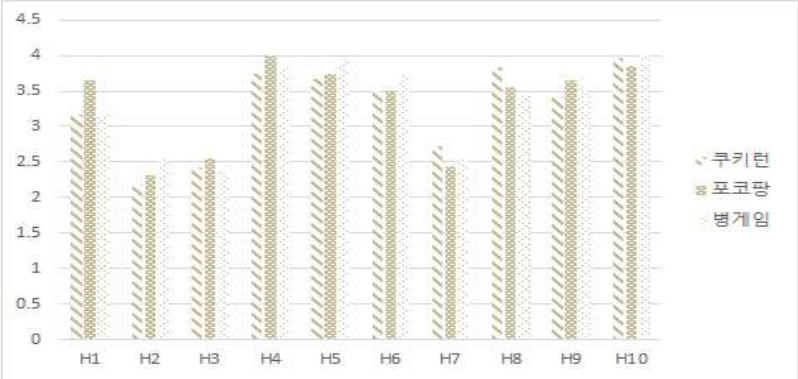
[Table. 4] mobile game evaluation criteria according to genre

No		Heuristics
H1	D8 + D9	Does a player concentrate on a screen when game starts?
H2	N5 + N8	Does a game advertisement interfere with game play?
H3	D10 + K2	How does concentration level change according to screen layout?
H4	N1 + N4	How does concentration level change according to game items?
H5	N1	How does concentration level change as game progress bar decreases?
H6	D6 + D11	How does concentration level change according to game stage?
H7	D6 + N10	How does concentration level change by a game help?
H8	K3 + K8	How does concentration level change according to position of game UI?
H9	N8	How does concentration level change according to game colors?
H10	K4	How does concentration level change according to game score?

3.2 The result of experiment

Three mobile games-cookierun, pokopang and bottle opening- were selected for experiment according

to genres. This paper conducted mobile game usability evaluation for sixty people who are in their 10's, 20's and 30's respectively. [Fig 1] shows the result of mobile game usability evaluation. The evaluation is comprised of ten questions. Five point scale - 'never', ' not', 'average' 'yes', "very"- was used for questions.



[Fig. 1] Mobile Games usability evaluation

It has been found that scores of H1 : 'does a player concentrate on a screen when game starts?' ‘H4 : ‘How does concentration level change according to game items?’ and ‘H10: ‘How does concentration level change according to game score?’ are the highest. In H1, both men and women showed high concentration on a screen before they start a game. In H4, game items influence concentration level. In H10, the higher score is, the less progress bar is, the higher concentration level is.

It has been found that scores of ‘H2 : ‘does a game advertisement interfere with game play’ and ‘H7 : How does concentration level change by a game help‘ are the lowest . Game advertisements disturb users in concentrating on a game. It has been found that users tend not to concentrate on a game help. For these reasons, two elements mentioned above act as unsatisfactory ones in users playing game.

4. Conclusion

Unlike general software, mobile game should enhance familarity, arouse interest and draw new experience. Advantage of heuristics is that it can find problems of usability easily and quickly. Heuristics is used for developing or evaluating system without aiming to understand human aspects of a

user such as user's interactive pattern, work and environment. Among various contents or software, as game has very sensitive and complex interface and leads a user to be immersed and entertain, it is not reasonable to apply general heuristics to a game. It is necessary to develop heuristics which is suitable for a relevant game because games vary in game and platform.

This paper conducted an experiment for sixty subjects by selecting three games per mobile game genre using heuristics suggested by Jakob Nielson, Desurvire and Korhonen. The result of the experiment showed that using a screen and game items before a game starts enhances concentration. The result of survey showed that game advertisements and game helps lower concentration.

Research that reorganizes heuristics based on this study and verifies through experiment and evaluates game user's usability using bio-signal will be conducted.

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