A Progressive Staged Digital Yoga Game to Stimulate the Interest of Elders

Jo-Han Chang, Yin-Syuan Liao, and Ting-Yi Wang

Abstract—This paper collect and sort out the following important points of the elder-digital game through literatures review; design a progressive staged digital Yoga game; and invite 30 participators to join the experiment of doing and saying as well as participate in the game interest questionnaire; discuss that if the digital game of this research can improve the elder’s interest in sport or not and the applicability thereof. By comparing the results of the Yoga teaching video and the progressive staged digital Yoga game, we learn that the advantages of the progressive staged digital Yoga game are the self-controlled action speed; the preferable and reliable performance and the clear feedback mechanism, only part of elders think the cognition of interface is still with difficulty. As the result of four objects in the game interest questionnaire, the participators confirm the game of this research is good in operability and is easy to understand, as well as can promote our physical and psychological health. Moreover, they think this research can be interrupted at any time and saved in playing, which is the most important function; the participator enjoy the interactive pleasure from feedback and the curiosity which can arouse to learn.

Index Terms—Digital game, elders, interest, sports.

I. INTRODUCTION

With the coming of the aging times, the topics of health and keeping fit for elders are concerned. Facing with the weakening physical function day by day, the elders can choose suitable leisure health activities, regular food and rest to slow down the retrogression, relieve pressure and relax [1].

In Taiwan, the most popular leisure activities of the elders are static activities, such as watching TV, listening to radio, walking, playing chess and so on, which is the life center of the elders [2]. The elders are lack of the intention and interest to participate in natural sports, and avoid daily sports with two reasons of “Incapable” and “No time” [3]. The past literatures research, through the life style, divide the interviewees in their 50’s into following types: open-minded and casual type, rule-abiding and cautious type, traditional conservative type, shrewd and autonomous type and conservative planning type. The results show that all elders of open-minded and casual type, rule-abiding and cautious type, traditional conservative type and shrewd and autonomous type are not like the natural sports [4]. For these reasons, the society should face the problems of sports and leisure for elders under the present environment, and actively propose the leisure sports which can stimulate the sport will of elders.

In many researches, the digital game is affirmed to improve the health of the elders [5]-[7], which is a contemporary leisure sport worth being developed. Also in some researches, the multimedia technology is pointed to be good for developing the student’s interest and intention in sports [8]. Thus, we believe that the digital sport game which stimulates the elder’s interest in sport is worth trying.

The game products can activate the physiological and psychological functions. Physiologically, play is sport, which can activate muscles and bones, improve the cardio-pulmonary function, enhance healthy and stimulate brain through the motion sensing game, thereby avoiding degeneration [2]. However, the cognition and learning ability of elders are degenerating, so it is not easy for them to understand the existing technological products in use. In motion learning, the sense of achievement as well as physical and psychological needs of the elders during the game needs to be concerned. Therefore, the research intends to provide a digital game which is suitable for elders through sorting out literatures, and discusses if the digital game can stimulate the elder’s interest in sports by the participator and testing.

II. LITERATURES REVIEW

A. Content Design Principle of the Digital Game for Elders

The purpose that the elders learn game is to interact with others. Therefore, the key-point of the game design is to achieve good game entertainment and applicability [9]. In order to prevent the psychological pressure caused, the game design for elder’s operation should be moderate in difficulty, simple in play; the subjects and contents are presented by the way of stages; and the game can be proceeded and interrupted at any time [2]. In addition, the game content must meet the user’s ability, which is designed based on previous experience in entertainment. For situational simulation, the multi-media must be properly used, which should have simple operation interface, so as not to cause a sense of frustration [9]. With the limitation of the elder’s psychology, the game design must avoid causing the frustration and fear of elders.

Previous researches show that the elders of open-minded and casual type, shrewd and autonomous type and conservative planning type prefer to Yoga [4]. With the mild action grading, Yoga can be set to be a staged game and be suitable for elders. Therefore, this research will take Yoga as the theme to design a progressive staged digital Yoga game.
B. The Eight Design Principles of Game Interface for Elders

The design principles proposed below were built eight golden rules of user-centered design [10], [11]:
1) Strive for consistency: Interface elements should be neatly and uniformly arranged with consistent style of color.
2) Enable frequent users to use shortcuts: Create shortcuts to all items in the main menu.
3) Offer informative feedback: Use effects when objects are tapped, such as change in color or icon size, and framing.
4) Design dialog to yield closure: When an action is completed the user should be informed by feedbacks, for ex: sound effects.
5) Error prevention: no more than 4 or 5 colours in the screen. Avoid using decorative images and colours between green and blue. Use black background with white text to yield the best reading speed. For better legibility, use proper brightness and contrast between background and text. The reading order should be left-to-right and top-to-bottom.
6) Permit easy reversal of actions: Add undo and redo options.
7) Support internal locus of control: Adopt single interface design. Add text to icons. Increase highlight on important messages.
8) Reduce short-term memory load: Prevent working memory overload. The interface should be designed to conform to the user’s mental model.

C. Action Grading of Yoga Game for Elders

In Yoga, sport hurt can be avoided by the view of preventive medicine, and a second hurt can be avoided by the view of rehabilitation, so that Yoga can make more positive biological method for human body [12]. Taking the physiological conditions of rehabilitation as the limitation of rehabilitation action [13], by referring to literatures, this research is applied by coordinating with the body-building exercises of Yoga Asana, and cautiously selects and recommends ten easy and safe position postures which can activate physical functions [3]; moreover, ten Yoga motions are converted to be the game stages based on the difficulty of Yoga presented by [14].

1) Stage I: Both [Eye Movement] and [Lion pose of Lion’s Roaring] only move the face muscle strength, which is easy for elders to exercise and named as stage I.
2) Stage II: [Lateral Bending of the Body], [Against wall, Straight back and Forward bend] and [Abdominal Twist] only use the single-muscle strength, which is junior difficulty.
3) Stage III: Both [Upward-facing Dog] and [Bhastrika] use two parts of muscle or balance ability, so the difficulty is enhanced.
4) Stage IV: [Heel Raise], [Bending knees and Twist] and [Simple Tree Pose] use the most muscle strength and balance ability, which is the most difficult for elders.

Due to the limitation of the sensing technology set by Kinect, this research remove three actions which is not easy to sense from the ten decided Yoga Asana actions[3], remaining seven Yoga Asana actions which are graded by their difficulty levels. The contents of seven actions are: Stage I is lion pose; Stage II is lateral bending of the body, and against wall, straight back and forward bend; Stage II is upward-facing dog; Stage IV is heel raise, bending knees and twist and simple tree pose.

With the goal of training the muscle strength of elders, Yoga actions are graded and converted to be a progressive staged game, which expects the elders can obtain the sense of achievement after challenging stages, and then achieve the effect of improving their intention to do sport.

III. Progressive Staged Digital Yoga Game

According the game design principles after literatures review, the eight design principles of game interface for elders and the four action stages of Yoga game for elders are used to design and develop the progressive staged digital Yoga game for elders. The design of the progressive staged digital Yoga game in the research is as below:

1) Game Contents: the contents are divided to be two parts. Part I is game instruction, which explains how to control the digital Yoga game by using the Kinect motion for sensing and describes the environmental safety in playing the game. Part II is formal game, which is divided into warming up, Yoga Asana and relaxation. Wherein, the Yoga Asana has four stages which have physical benefits description of the action before playing. The game can be interrupted or paused at any time, and display [Star] image by every break of the stage to feed back to participant visually; the assessment with three stars present the fluency, accuracy and completion of the Yoga Asana actions; Furthermore, the game can feed back with the sound of “Ding-Dong” to inform the player that the asana is right; or to encourage the player with the “sound of people”, during playing yoga Asana, the game builds a relax Yoga circumstances by using a relax crystal music with slap, chirp and other smoothing music.

2) Game Interface Design: consistent style, size and consistent elements; pure color with the main color of sea-blue, sand-yellow, grey and black. The style is fresh and natural; the length and width of interface is set to be 1920*1080pt; the message is displayed in black color with yellow background; the font size is set to be 14pt; and the press-button is designed to be grey with white background, the size is 189*0.96pt; the press-button will show blue light when players slid ( the around of the press-button heaves to strengthen the visual effect), show blue light and make a sound of Ding-Dong when the players click and choose; the game is made by Photoshop and flash software, and the made test sample interface is shown as following (as Table I):

3) Game Media: The game is played as the Kinect motion sensing. The right hand can choose by directly staying 3 seconds on the press-button of interface, which satisfies the intuitive operation. The accuracy of Yoga asanas in the game is detected by Kinect, and the actions are set with a fixed range, you can break stage by achieve in the range.
IV. RESEARCH METHOD

The test is to learn the applicability of the progressive staged digital Yoga game and to investigate the operation feedback of the normal Yoga teaching video and progressive staged digital game from the participator.

A. Participant

30 persons between 50 to 70 years old, with health state of self-care, and wearing the suitable clothes for sport.

B. Test Devices

General Yoga teaching video and Progressive staged digital Yoga game

C. Test Methods

1) Actually join the test: Saying and doing: use Yoga teaching video and progressive staged digital Yoga game respectively to do four Yoga actions. In order to avoid the influence of the test sequence on likability and learning interest, we randomly divide participator into two groups, the first group does Yoga with the Yoga teaching video firstly, then plays the progressive staged digital game; and the other makes the reversed sequence. The participators are asked to do and say if there is difficulty and suggestion during the progress.

2) Questionnaire: Interest Scale The goal of the questionnaire in the test is to integrate the interest and preference of the elders to digital game, the questionnaire draws up the standard based on the questionnaire subjects decided [15], there are seven objects: safety, joined space, development space, playable space, interesting, singularly lacking and playability. We investigate the interest comparison of home-use digital Yoga game for elders in this research, so we do not discuss the safety, joined space and development space, and mainly appraise through comparison of playable space, interesting, singularly lacking and playability.

V. RESULTS

A. Actually Joint Test: Result of Saying and Doing

Sort out the result of saying and doing in Table III. Comparing the Yoga teaching video and the progressive staged digital Yoga game, we realize that the advantages of the progressive staged digital Yoga game are the speed of self-controlled action; the preferable and reliable performance and the clear feedback mechanism, only part of elders think the cognition of interface is still difficult.

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TABLE I: TEST SAMPLE OF PROGRESSIVE STAGED DIGITAL YOGA GAME

<table>
<thead>
<tr>
<th>Main interface</th>
<th>Stage interface</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Yoga asana interface" /></td>
<td><img src="image2" alt="Interace of breaking through" /></td>
</tr>
</tbody>
</table>

TABLE II: QUESTION IN INTEREST SURVEY OF PROGRESSIVE STAGED DIGITAL YOGA GAME

<table>
<thead>
<tr>
<th>Digital UE Object</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Playable space refers that whether the toy or game has timeliness</td>
<td>1 I like the re-playable function set in this game</td>
</tr>
<tr>
<td>2 I like the challenge of difficulty applied in this game</td>
<td></td>
</tr>
<tr>
<td>3 I like the stage difficulty control set in this game</td>
<td></td>
</tr>
<tr>
<td>4 I think the skill development set in this game improve my skill</td>
<td></td>
</tr>
<tr>
<td>5 I like the setting of progressive staged difficulty in the game</td>
<td></td>
</tr>
<tr>
<td>6 I like skippable selectivity in the game</td>
<td></td>
</tr>
<tr>
<td>7 I like the progressive staged difficulty control provided in the game</td>
<td></td>
</tr>
<tr>
<td>8 I like the function of save and continuing in the game</td>
<td></td>
</tr>
<tr>
<td>9 I think the game is full of originality (such as style, characteristic, value and entertainment)</td>
<td></td>
</tr>
<tr>
<td>Interesting Is this game can make you are high-achieving?</td>
<td>1 I like the feeling of self-breakthrough in the game</td>
</tr>
<tr>
<td>2 I think the game give me enough immersion and expectations in heart</td>
<td></td>
</tr>
<tr>
<td>3 I like the interactive pleasure from the feedback after controlling the game</td>
<td></td>
</tr>
<tr>
<td>4 I like the feedback interesting from the game(such as vision and hearing)</td>
<td></td>
</tr>
<tr>
<td>5 I like the sense of achievement from the virtual reward in the game</td>
<td></td>
</tr>
<tr>
<td>6 I like the sense of achievement provided after finishing the game</td>
<td></td>
</tr>
<tr>
<td>7 I like the amazing and interest from the game</td>
<td></td>
</tr>
<tr>
<td>8 I think the sensory effect provided by the game stimulate my curiosity to learn</td>
<td></td>
</tr>
<tr>
<td>9 I think the cognitive effect provided by the game stimulate my curiosity to learn</td>
<td></td>
</tr>
<tr>
<td>If the rarityness of the game is the toy or game can make up your deficiency?</td>
<td>1 I think the game is full of Educational significance</td>
</tr>
<tr>
<td>2 I think the game has the ability to enhance the user’s physical and physiological healthy</td>
<td></td>
</tr>
<tr>
<td>3 I think the game is suitable for elders</td>
<td></td>
</tr>
<tr>
<td>4 I think the game is suitable for boys</td>
<td></td>
</tr>
<tr>
<td>5 I think the game is suitable for girls</td>
<td></td>
</tr>
<tr>
<td>Playability: Do you think the toy or game is easy to play?</td>
<td>1 I think the game is easy to play on physiology</td>
</tr>
<tr>
<td>2 I think the game is easy to play on psychobiological cognition</td>
<td></td>
</tr>
<tr>
<td>3 I think the game is easy to understand and realistic on cognition</td>
<td></td>
</tr>
<tr>
<td>4 I think my own skill affect the playability of the game</td>
<td></td>
</tr>
<tr>
<td>5 I think the input operation in the game is easy to play</td>
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<tr>
<td>6 I like the game rule which suit my logic thinking</td>
<td></td>
</tr>
<tr>
<td>7 I like the order of the game progress which cannot cause confuse and repulsion</td>
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</tr>
</tbody>
</table>
We find from the average score of 4 objects, the evaluation this research is easy to operation and understand for elders. According to the results of playability, we believe the elders think the digital Yoga game is more suitable for psychological health, thus the elders most focus on the effect curiosity which can arouse to learn. According to the results of interesting, it is found that the elders extremely appreciate that they can adjust the level in the game stages is important too, and the selectivity auction is the most important during playing game; secondly, that the game can be interrupted at any time and the save space will not cause frustration. The content is designed without ranking and scoring, which will not cause the nervous and psychological burden to elders. Since the game can be stopped at any time, the stages and tasks are not easy to cause addiction.

B. Questionnaire: Result of Game Interest Scale

Table IV is the scored of titles in digital game interest scale. We find from the average score of 4 objects, the evaluation score of participator on the playable space and playability is higher than average score.

<table>
<thead>
<tr>
<th>Title No</th>
<th>Playable space</th>
<th>Interesting</th>
<th>Singularity lacking</th>
<th>Playability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4.30</td>
<td>4.13</td>
<td>4.20</td>
<td>4.23</td>
</tr>
<tr>
<td>2</td>
<td>4.30</td>
<td>3.83</td>
<td>4.50</td>
<td>4.27</td>
</tr>
<tr>
<td>3</td>
<td>4.27</td>
<td>4.17</td>
<td>4.20</td>
<td>4.30</td>
</tr>
<tr>
<td>4</td>
<td>4.10</td>
<td>4.07</td>
<td>3.53</td>
<td>4.00</td>
</tr>
<tr>
<td>5</td>
<td>4.23</td>
<td>3.93</td>
<td>4.20</td>
<td>4.30</td>
</tr>
<tr>
<td>6</td>
<td>4.37</td>
<td>4.07</td>
<td>4.20</td>
<td>4.10</td>
</tr>
<tr>
<td>7</td>
<td>4.37</td>
<td>3.97</td>
<td>4.27</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>4.40</td>
<td>4.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>4.17</td>
<td>4.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>4.28</td>
<td>4.06</td>
<td>4.13</td>
<td>4.23</td>
</tr>
</tbody>
</table>

According to the results of playable space, the elders think that the game can be interrupted at any time and the save auction is the most important during playing game; secondly, that the elders can self-control and select the action difficulty level in the game stages is important too, and the selectivity of skipping is thirdly important. It can be found that the elders extremely appreciate that they can adjust the self-control of the game according to their own conditions. According to the results of interesting, it is found that the elders enjoy the interactive pleasure from feedback and the curiosity which can arouse to learn. According to the singularly lacking, the elders think the highest score is the function of the game to enhance the physical and psychological health, thus the elders most focus on the effect of the game function which can supplement their faults, and the elders think the digital Yoga game is more suitable for girls. According to the results of the playability, we believe this research is easy to operation and understand for elders.

VI. CONCLUSION AND DISCUSSION

Through literature review, this research discusses the following important points of the elder-digital game: the content design principle of the elder-digital game, the eight design principles of game interface for elders and the action-grading of the elder-Yoga sport game; we design and develop a progressive staged digital Yoga game and invite participator to join the test so as to discuss if the digital game in the research can improve the elder’s interest in sport or not and the applicability thereof. Finally, we collect the results of this research by three layers designed [16] as below:

1) Instinct Design: As the good gist of the game for elders, the game should interact with other people and be designed with multi-element game content based on past experience and culture of elders. Yoga is from India, similar to Tai Ji in Chinese culture, Yoga belongs to smooth and soft body movement, and very popular in elders, especially for female.

2) Behavior Design: The game contents can be easily understood through sense organ and mental model, such as clear words, simple interface, and simple operation. It can be recovered in case of wrong operation, which will not cause frustration. The content is designed without ranking and scoring, which will not cause the nervous and psychological burden to elders. Since the game can be stopped at any time, the stages and tasks are not easy to cause addiction.

3) Introspection Design: We determine if the game design needs to be improved or not from the elder’s view. After the interview, comparing the teaching video and digital game, we note that all elders think the digital game is more interesting and the accuracy of the actions can be known, which thereby improves their intention to learn the digital game. However, the operation must be easy and more interesting. Part of participator suggest that the digital game be simultaneously used by more than two people to improve interaction; elders focus on the effect achieved in every action, which can be expressed by feedback of image, sound and words. In addition, they express their intention and interest to strengthen the use of extensible resource. In the future, we can strengthen the intention and interest to play the game by the way of extending game resource, for example: long-term feedback of health protection effect, the function of social intercourse with friends, and addition of more actions related to stages and Yoga, and so on.

ACKNOWLEDGMENT

Special thanks to National Science Council (NSC 100-2221-E-027-112-) for its support for this study.

REFERENCES


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