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CAPD eBook: a Multimedia Approach for Renal Patients with Adaptation of Persuasive Technology

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ABSTRACT

CAPD eBook is a multimedia application that has been developed as a guide for renal patients on how to perform Continuous Ambulatory Peritoneal Dialysis (CAPD) in their daily life. The application has embraced multimedia elements such as text, animation, audio and graphic to ease renal patients in the learning process. This multimedia application is specifically designed to assist renal patients to learn and perform CAPD procedures as a way to remove toxin from their body. Additionally, the principle of Persuasive Technology has been adapted into CAPD eBook to increase effectiveness; this is to engage patients in using the application. Persuasive Technology is one of the techniques to persuade and encourage people in many aspects especially in the learning process. In order to evaluate the application, Usability and Heuristic Test have been conducted to assess the convenience and significance of Persuasive Technology Principles in CAPD eBook. The results have shown a significant impact and important benefits provided to renal patients.

Keywords: Persuasive Technology, CAPD (Continuous Ambulatory Peritoneal Dialysis), renal patients, multimedia application.

1. Introduction

Renal failure or kidney failure describes a medical condition in which the kidneys fail to function in the human body. This research focuses on CAPD (Continuous Ambulatory Peritoneal Dialysis) which is one of the treatments that renal patients could choose to remove waste in their body. A multimedia application has been developed to guide renal patients on how to use CAPD in their daily life.

In order to persuade renal patients to learn and self monitor their CAPD procedure, there is a need for a more user friendly tool to assist them. With this tool, renal patients will reduce their time to learn all the steps that they should do in CAPD procedure.

At present, patients and nurses manually learn the procedure of CAPD where the process is quite complicated and difficult for new renal patients. Without motivation, renal patients will depend on other people to perform CAPD for them and this will contribute to dependency and complications in their future life. Therefore an assistive tool that is incorporated with persuasive technology is needed to enhance the learning method. Furthermore, this eBook could motivate and persuade renal patients to learn all the steps in CAPD procedure efficiently and self monitor their CAPD procedure. CAPD eBook provides an alternative method using interactive multimedia environment, so that patients will be able to control, learn and use the application according to their needs.

The rest of this paper is organized as follows: The second section introduces the Continuous Ambulatory Peritoneal Dialysis (CAPD) procedure and discusses the Principles of Persuasive Technology. The next section focuses on the methodology and the Persuasive Technology adaptation in CAPD eBook. The paper ends with conclusions and generalizations from the results of the analysis.

2. Research Background

2.1 Continuous Ambulatory Peritoneal Dialysis (CAPD)

Continuous Ambulatory Peritoneal Dialysis (CAPD) is a dialysis used by renal patients to prolong their life; this is one of the options besides using



haemodialysis. The purpose of CAPD is to remove extra water, wastes and chemical for end-stage renal patient. The process takes place inside their body using the natural lining of the abdomen. A patient should undergo a minor surgery at the beginning of CAPD to insert a Tenckhoff catheter in the abdomen (Munib, 2006). It is a technique which refers to the infusion of dialysis solution into the peritoneal cavity, followed by a variable dwell time and subsequent drainage. CAPD is a continuous treatment consisting of four to five dialysis exchanges per day (Graham-Brown, 2012). It manipulates the gravity to fill and drain the peritoneal cavity by connecting tubes and solution bags.

2.2 Principles of Persuasive Technology

Persuasive Technology is defined as any interactive computing system which is designed to make a change in people's attitudes and their behaviors (Fogg, 2003). For example, persuasive technology will encourage teams to set their goals and achieve deadlines. An interactive technology could play a major role in the human life.

There are 8 steps of design processes to create persuasive technology which are, choose a simple behavior to target, choose a receptive audience, find the target behavior, choose a familiar technology channel, find the relevant examples of persuasive technology, imitates successful examples, tests and iterate quickly and expands on the success (Fogg, 2009; Khaled, 2005). The following steps in figure 1 show the increase of success probability.

2.3 The Application of Persuasive Technology to Educational Setting

Paradigm of teaching explains how education should be conceptualized, how the different tools or methods can be used and give suggestions for good practices (Mintz, 2010). Persuasive technology can change the concept of teaching in order to change human behavior. It also resides outside of a defining social context. In this research paper, the three most appropriate persuasive principles have been studied, which are Principle of Tunneling, Principle of Self-Monitoring and Principles of Attractiveness.

2.3.1 Persuasive Technology: Principle of Tunneling

Tunneling technology in persuasive technology is a principle whereby the computer acts as persuasive tools (Fogg, 2009). The user will be guided in

a set of procedures that has been determined earlier. With the predetermined sequence of actions, tunneling makes it easier for user to undergo a process. This can be an effective and useful persuasion strategy. People often put themselves into tunnel situations voluntarily to change their attitudes or behavior.

2.3.2 Persuasive Technology: Principle of Self-Monitoring

In order to transform the users' attitudes and behaviors to achieve a predetermined goal, one of the persuasive technology principles that can be applied is the principle of self-monitoring. The motivation behind using self-monitoring technology is to avoid boredom and to increase the behavior performance of the users (Khaled, 2005). Based on the study, this principle could also facilitate users to learn more about themselves.

2.3.3 Persuasive Technology: Principle of Attractiveness

Attractiveness is one of the important characteristics to excite users in using multimedia application. Principle of attractiveness is focusing on visual attractiveness in order to attract and persuade users (Fogg, 2003). In multimedia application, attractiveness can be implemented by combining text, graphic, animation, and sound. It is proven that multimedia can assist in increasing one's attention, retention, understanding and influence in the learning process enhancement (Evans, 2007).

3. Methodology

The research has been performed based on the research model as represented in figure 2. It involved five phases which are Information Requirement, Analysis, Design, Development and Testing.

3.1 Information Requirement

The first step involved planning, which was the review on Continuous Ambulatory Peritoneal Dialysis (CAPD) patients and articles, aspects and elements of multimedia, Persuasive Technology Model and its list of principles. After reviewing the related articles or journals, the literature review was delivered. Next, information gathering activities were done with the aim of gaining insights from the target audience. In this phase, the focus



the aim of gaining insights from the target audience. In this phase, the focus was on analyzing the process implicated in CAPD for renal patients. There were procedures that renal patients should know in order to perform the peritoneal dialysis. The complete procedures were gathered from patients and nurses via observations and interviews.

3.2 Analysis Phase

The next activity was to analyze the user requirement such as application functions and content, software requirement; authoring software, graphic software, video and audio software, and hardware requirements such as voice recorder, storage, laptop or computer specification as to design the multimedia application.

3.3 Design Phase

Based on the data from information gathering, sitemap, storyboard and interfaces were sketched using drawing tools which are a drawing tablet. Sitemap is a view of the multimedia application structure whereas storyboard is a sketch to illustrate the initial view of project design. The next activity was the interface design, where the graphic and authoring software were used to complete this task. In this phase, the appropriate principles of Persuasive Technology have been adapted in the design of the application; this is to enhance the interface design and its effectiveness.

3.4 Development Phase

During development phase, the designed interfaces were integrated into an application by applying multimedia scripting. During this process, the application was integrated and published as an executable file.

3.5 Testing Phase

In order to ensure the usability aspects of the application, a series of testing has been performed which are Usability Testing and Heuristic Evaluation; this testing involved the kidney patients who are using CAPD, nurses or medical practitioners from CAPD Unit and the patient's family members. After that, a refinement on the application was carried out based on the feedbacks. Finally, the interactive multimedia application was produced as a CAPD eBook.

4. Persuasive Technology Adaptation in CAPD eBook

CAPD eBook has been developed specifically to assist renal patients to learn and perform Continuous Ambulatory Peritoneal Dialysis (CAPD). CAPD is one of the treatments that renal patients could choose to remove toxic waste and creatinine in their blood. CAPD eBook has included three main modules which are: 1) Hand Wash, 2) CAPD Procedure, and 3) CAPD Animation. These modules are designed with interactive multimedia technology and incorporated with Persuasive Technology.

4.1 Hand Wash

Hand wash is a scene designed to show an appropriate technique for users or patients who is CAPD user. Figure 2 shows the interface of hand wash scene. This scene provides buttons to go to another scene on the left sight. The scene includes steps that users need to follow and the researcher has provided a next button to go to the next page. It was applied with the principle of attractiveness in persuasive technology to persuade users or patients to be attached to CAPD eBook with the use of text, images, animation, and audio.

4.2 CAPD Procedures

This scene is designed to show the procedure of CAPD. Renal patients should follow every step of the procedure to do their dialysis. Figure 3 shows design of interface in the procedure scene that consists of six buttons such as main menu, hand wash, animation, exit, next and previous. Each button can be used by users to go to another scene. In this scene, an interactive book in which every page contains the steps that users or patients must follow is designed. Principle of tunneling in this scene is adapted to persuade users to undergo CAPD process. This principle utilizes computer technology to guide users through a process. It also applies the principle of self-monitoring which renal patients need to monitor themselves during the processes. It was interesting when the renal patients could learn the procedure of CAPD without the need of an assistant.

4.3 CAPD Animation

Figure 4 shows the illustration of animation scene interface. It contains four



navigation buttons that could be linked to the other scenes. Animation scene is designed to show the process that will be experienced by CAPD users. The adaptation of attractiveness principles is incorporated in this scene.

5. Result and Discussion

Usability test was performed to measure all the criteria of multimedia application such as objective of application, content, interactivity, sound, navigation and interface of the application. The overall result was illustrated as in Figure 6 where the ranking 1 to 5 is used to justify each of the components from Strongly Agree to Strongly Disagree. Most of the respondents agree that this application achieves its objectives (mean=4.60), the contents and structures are well arranged and easy to understand (mean=4.20), the interactivity is good (mean=4.20), the navigation is simple and direct (mean=4.40), the interface design is interesting, engaging and attracting (mean=4.60), the sound is clear and pleasant (mean=4.40) and the respondents agree that this application is interesting and knowledgeable (mean=4.40).

Whereby, Heuristic evaluation is a form of usability inspection where usability specialists judge whether each element of a user interface follows a list of established usability heuristics. According to Alsumait (2010), the heuristic evaluation method can consist of one or more experienced evaluator (3 to 5 recommended). Therefore, 3 participants were involved in the evaluation of the Persuasive Technology Principles. Based on figure 4, it is found that 33.3% of evaluators were strongly agreed with the successful implementation of persuasive technology embedded in the eBook, while the other 66.6% evaluators were agreed.

6. Conclusion

The use of persuasive technology in multimedia application is one of the effective ways to encourage renal patients in learning CAPD procedures. CAPD eBook has adapted the principle of persuasive technology such as principle of self-monitoring, principle of tunneling, and principle of attractiveness to engage the user's attention and learning span. This has been proven from the Usability and Heuristic Test, where the result clearly indicates that the principles of persuasive technology are successfully adapted in the eBook and has increased knowledge and understanding in

regards of the CAPD procedures. This shows that the combination of interactive multimedia and persuasive technology comprises a significant impact on renal patients learning process.

It is recommended that in future, this application can be improved by adapting further appropriate principles and utilizing full animation features such as 3D animation in guiding renal patients to perform CAPD procedures.

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Notes

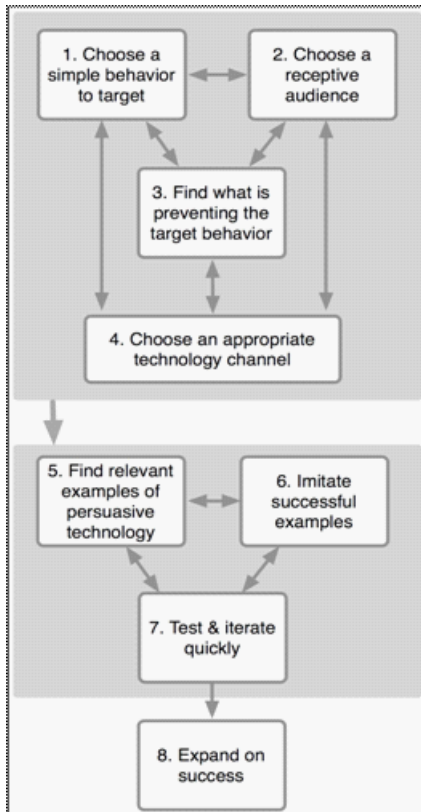


Figure 1: Eight Step Design Process

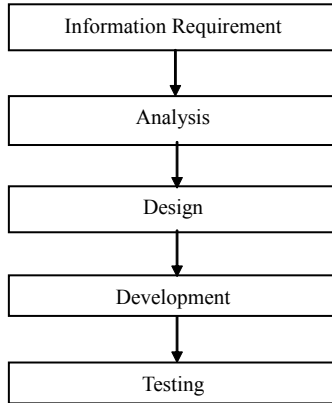


Figure 2: Research Model



Figure 3: Hand Wash

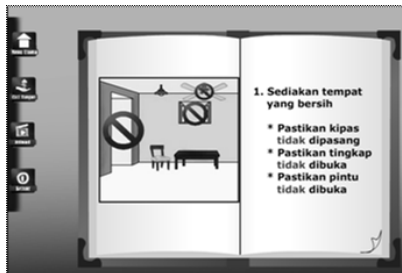


Figure 4: CAPD Procedures

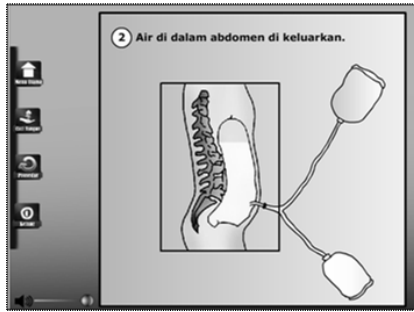


Figure 5: CAPD Animation

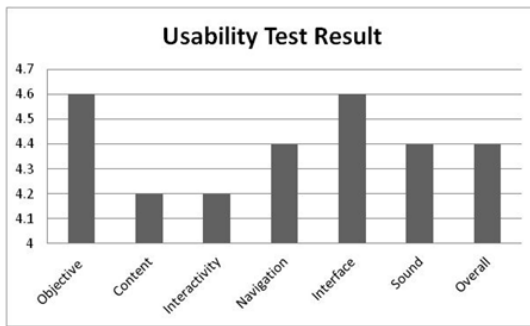


Figure 6: Results on Usability Testing



Figure 7: Results on Heuristic Evaluation



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