USABILITY ASSESSMENT OF E-CAFÉ OPERATIONAL MANAGEMENT SIMULATION GAME

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ABSTRACT

To ensure the quality of digital simulation game, we utilized the usability evaluation heuristic in the design and development processes of e-café operational management game-based learning material for students. The application of usability evaluations during this study is described. Additionally, participant selection, data collection and analysis; and results relevant to usability portions of this study are presented.

KEYWORDS

Usability assessment; usabilty testing; simulation, digital game

1. INTRODUCTION

Nowadays college and university students have never experienced a world without computers. Since digital simulation game is designed more visual, interactive, and focused on problem-solving (Pasin, & Giroux, 2011). It is more attractive for students to learn the complex knowledge via digital simulation game for college students. Therefore, this study employed design-based research to examine the design and development of an educational game simulating the daily operational management of an "e-café". This study employed the principle of "usability" to determine whether this material corresponds to the above principle and whether it can meet the expectations of learners as an education resource.

2. LITERATURE REVIEW

2.1 Digital Simulation Game

Digital simulation games are used for education and training in a wide range of fields including the military, medical services, and scientific experiments. Unlike digital games, simulation games are usually less associated with fantasy. Simulation games involve players assuming roles through which they seek to resolve issues or accomplish missions (Charsky, 2010). Digital simulation facilitates learning within created scenarios while enjoying gameplay that greatly resembles situations in the real world. Following a series of game activities, learners respond to various scenarios while achieving learning objectives. Researchers have indicated that digital games with educational functions can exert a positive effect on learners with regard to motivation and performance (Tompson & Dass, 2000, Bai, Pan, Hirumi, & Kebritchi, 2012).

2.2 Usability Testing

Usability can reveal whether a given product serves the needs of users and whether the product can be operated intuitively. Nielson (1993) proposed five indicators for the evaluation of usability: learnability, efficiency, memorability, and error and satisfaction. These indicators can be used to determine whether users are able to browse a webpage without facing obstacles, whether the page can be accessed intuitively, and

whether the webpage provides information sufficient to satisfy the needs of users. The International Organization for Standardization (ISO) pointed out in 1998 (ISO 9241-11) that "Usability' refers to the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use." The most common methods employed in the evaluation of usability include heuristic evaluation and usability testing. This study recruited subjects with the aim of revealing user problems, evaluating the usability of the educational simulation game, and providing the basis from which to revise teaching materials in the future.

3. METHODOLOGY

Our evaluation of usability involved both quantitative and qualitative methods, the collection of data through questionnaires, observation and interviews, and the compilation of opinions and suggestions for the design and usability of the e-café simulator. This study will expound the subjects, testing processes, and research tools as follows.

3.1 Subjects and Testing Processes

Ten participants were invited to take part in the testing of a simulation game with regard to usability. All participants were college students at a male/ female ratio of 3:2 and all were participating in this type of exercise for the first-time. Through feedback from the subjects, we came to realize the needs of users and revised the simulation game accordingly. Tests and interviews were conducted with regard to the content and usability of the game.

3.2 Testing Tools

Each participant was observed one-on-one in the usability testing process and Morae software was applied to videotape the entire process. Prior to testing, the objectives of the evaluation were outlined for participants, who were then requested to sign a consent letter. Throughout the testing process, the participants were closely observed and provided objectives (tasks) in accordance with their progress. Subjects were expected to accomplish each phase of their tasks in accordance with the statements provided by observers. Participants were expected to undertake eleven missions and observers kept a close eye to verify whether they were able to complete them on their own.

3.2.1 Questionnaire on Task Difficulty

The eleven tasks in this study were designed to determine whether the subjects were able to complete the tasks they were assigned in the digital simulation game. Questions were ranked on a scale of 1 to 5 with 1 representing "very easy" and 5 representing "very difficult".

3.2.2 Questionnaire on User Experience

This study adopted the TAM model to measure the responses of participants following completion of the simulation game. This questionnaire comprised a total of 22 questions in four dimensions: attitude, perceived ease of use, intention to use, and perceived usefulness. Questions were ranked on a scale of 1 to 5 with 1 representing "strongly disagree" and 5 representing "strongly agree".

3.2.3 Interview Outline

Following completion of the usability test, interviews were conducted to determine the feelings of participants. The four interview questions were as follows:
Q1: Did you encounter any problems when undergoing tasks in the game? How did you resolve them?
Q2: Did you better comprehend the process of running a café after completing the "e-café" simulation game?
Q3: Please outline the concepts related to business administration that you learned from the game?
Q4: Do you think the "e-café" management simulation game helped you to acquire knowledge about business administration?

4. RESULTS

4.1 Result Analysis for the Questionnaire on Tasks Difficulty

The questionnaire was meant to determine how the subjects felt about each mission. For the eleven question items, the average score was 1.8 (SD=0.93). The scale of difficulty ranged from 1 (very easy) to 5 (very difficult). The participants felt that task 8 was the most difficult to accomplish (M=2.7), followed by task 10 (M=2.2), task 6 (M=2.1) and task 7 (M=2.1). Task 8 involved adjusting the shift schedule. Task 10 required that participants organize staff training sessions. Task 6 required subjects to improve the quality of raw materials. Task 7 required subjects to devise a marketing approach to expand the customer base. In task 5, participants were required to adjust the selling price.

4.2 Result Analysis for Game User Experience

Questions were ranked on a scale of 1 to 5, with 1 representing "strongly disagree" and 5 representing "strongly agree". As shown in Table 4, the average score was 3.5 (SD=0.86), suggesting that participants had positive attitudes toward the simulation game. In the "Attitude" sub-category, the four questions averaged 3.7 (SD=1.01), implying that most of the subjects enjoyed the simulation game. In "Perceived ease of use," the five questions averaged 3.44 (SD=0.88), which indicated that participants felt the game was easy. In "Intention to use," the three questions averaged 3.9 (SD=0.85), and each sub-question reached 3.8 or more, indicating that subjects strongly accepted the simulation game. The average score for sub-question 3 was 4.1 (SD=0.74), indicating that subjects were keen to participate in simulation games. In "Perceived usefulness," the five questions averaged 3.36 (SD=0.8), indicating that participants felt the digital simulation game is useful for them.

4.3 Result Analyses of Interviews

Interview analysis was meant to reveal the experience of users and examine areas that were not adequately covered by questionnaires or observation. Interview analysis related to the questions is as follows:

Q1. Did you encounter any problems when undergoing missions in the game? How did you solve it?

Ten participants outlined problems they encountered when playing the simulation game. Three subjects did not know that the staffer's name could be clicked. Two of the participants were unable to differentiate the faces of staffer and felt that a failure to mention the names of staffers made it difficult to arrange shift schedules. One participant did not know that the page could be changed from the counter to the guest area simply by clicking and kept wondering why the coffee machine could not be clicked to make repairs. However, most of these were resolved after the subjects tried several times. Clearly, the simulation game requires the means to explain all of the game functions. Nonetheless, these observations elucidated the needs and expectations of the subjects, such that the game could be improved in the future.

Q2. Did you better comprehend the process of running a café after completing the "e-café" simulation game?

Nine out of ten subjects (except for S8) believed that the simulation game helped them to understand how to manage a café.

Q3. Please outline the concepts related to business administration that you learned from the game?

All subjects felt that they developed their skills related to business administration from the simulation game. These skills included cost control, arranging shift schedules, picking the location in which to open a shop, the management of raw materials, equipment repair and maintenance, profit, and procurement. Nonetheless, a number of other opinions were also expressed:

S1: It appears to me that hands-on experience would be more helpful. S2: I never took any class in business administration before, so I cannot say for sure. As to concepts, I think the most helpful ideas were about management, shift schedules, and the timing of equipment maintenance/repair. S4: I believe that cost control and customer satisfaction were dealt with effectively in the game.

Q4. Do you think that the e-café management game was of any help to you in acquiring knowledge in business administration?

Eight subjects believed that the simulation game could be used to complement business administration curriculum. However, S1 and S8 disagreed.

S5: Yes. (The researcher asked about why.) Ugh, seems that we can have a better time in the classroom. S6: Yes, I enjoyed playing the game. S6 felt that if this game was played during class, they would not need to peruse reading materials. S8: I have never taken any classes in business administration; however, I am left wondering if this would be too simple to be fit into the real world. For example, staff affairs appeared too simplified. Raw materials, prices, and the quality of materials appeared more authentic.

5. DISCUSSION AND CONCLUSION

We conducted an examination of the usability of the "e-café management digital simulation game" as well as the test results and feedbacks from the participants. Our aim was to identify the areas corresponding to the expectations, requirements, and suggestions of users for use as a reference in the development of educational simulation games.

With regard to usability, every participant presented a positive attitude toward every dimension of the e-café simulation game. The mission observation and the scale of difficulty perceived by participants were matched, as subjects encountered difficulties in the complex missions but felt that most of the missions were quite easy. Interviews revealed that subjects regarded the game as a valuable tool in developing the skills required for shop management. We believe that the reason for the strong acceptance of the simulation game was its overall design, which accurately represented a real coffee shop. It is our hope that this study provides a valuable resource for the development of digital simulation games as an educational resource.

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