A Measure of the Effectiveness and Efficiency of an M-Cinema App

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Abstract: This study presents the results on the usability testing done on Golden Screen Cinema (GSC) mobile appli-cation at two sites: Polytechnic Balik Pulau, Penang and Poly-Tech College Mara (KPTM) Alor Setar, Kedah. The purpose of the testing was to elicit the overall reactions of users to the GSC mobile applica-tion with respect to the user interface, terminology and informa-tion, application capability and general impression. There were twenty volunteer participants who were recruited for the usability testing. Ten were used at Polytechnic Balik Pulau, Penang while the other ten were used at Kolej Polytech Technology Mara, Alor Setar. Of the 20 participants, 17 had no prior experiences on the use of GSC mobile application while 3 had experience on the use of GSC mobile application. The test result showed that the GSC app is both effective and efficient. Thus, indicating that the mo-bile application has good usability in terms effectiveness and efficiency. However, the participants' facial expressions and body language while performing tasks revealed that some of them had some challenges. Features in the GSC app, such as choosing seats and making payment made some of the participants react uneasily and with caution because of their lack of confidence as it had to do with financial matters. Based on observation, most of the participants looked nervous and felt uneasy during the ses-sion. This was so even though a brief briefing about the test was given to avoid such nervousness.

Keywords: Effectiveness, efficiency, mobile application; mobile experience; usability testing.

I. INTRODUCTION

Golden Screen Cinema (GSC) is an application that brings to users a listing of GSC movies with real-time show times and the option to select seats and purchase movie tickets via smartphone. GSC mobile application is available on all major mobile platforms including the iOS, Android and Win-dows. The application offers a revolutionary e-purchase of movie tickets and popcorn combos. E-Purchases can be made anytime, anywhere via Hong Leong Connect, May-bank2u, CIMB Clicks, PayPal, Visa Checkout, AMEX or credit cards. This ticketless option that features a QR code on the mobile phone eradicates queue and waiting time. Movie admission is a scan away at the auto-gates Five ser-vices provided by GSC mobile application were selected to be performed at the usability testing.

These include: i) download and install the GSC applica-tion, ii) login – register account on the GSC application, iii) check on GSC movie listing, iv) purchase a ticket, and v) FastTicket. The services offered through the use of the GSC web portal have proven their value by providing twenty-four hours service to users [1-7].

The usability testing was conducted in a testing room where the participants completed the five tasks that were assigned to them. The session for the usability testing was recorded and analyzed to effectively identify problems that sometimes can only be accomplished by repeated testing and with several iterations on the design. It is an excellent way to gain valuable insights into what works and what does not in the application or what is suitable or not suitable for the application [8-15].

GSC mobile application usability testing used a live ver-sion of the application located on android smartphone. One laptop was used to video record each participant and cap-tured their faces, comments and questions. The usability testing also used screen recorder to capture every single par-ticipant's touch on the smartphone screen. This was done to capture participant who were struggling with any given task [16-25].

II. METHODOLOGY

Roles of participants: The table below (Table 1) shows the allocated roles and the responsibility given to facilitators and participants in the usability testing session:

Table. 1 Roles of facilitators and participants

Participants	Roles
Facilitator A	-Pre-test briefing for participants at KPTM Alor Setar -Observing participants in test ses-sion. -Recording the test session. -Conducting post-test interviews on participants.
Facilitator B	-Pre-test briefing for participants at Politeknik Balik Pulau. -Observing participants in test ses-sion. -Recording the test session. -Conducting post-test interviews on participants.
Test Participants	-Testing the GSC mobile apps with 5 tasks. -Completing a post-test question-naire.

Participants: The facilitator invites in one session, ten participants into the testing room. The usability testing facilitator then explained the instructions that needed to be followed by participants. Each individual session lasted for approximately 20 minutes. During the session, the facilitator explained the test session and asked the participants to read the task scenarios and urged them to do the task using android mobile application. After the test session, the facilitator then made the participants to fill out a post-test questionnaire. The table below (Table 2) shows the demographics of participants. Participants in the 20 to 25 age category were 14 in number. Nine (9) of them were females and 5 were males. Of the 14, only 2 had prior experience on the mobile application. Also, only 3 participants each were in the 26 to 30 and 31 to 35 age categories with all participants being females. Participants with experience were only one for the 26-30 category while there was none for the 31-35 age category [26-37].

Table. 2 Demographics

Number of participants	Age	Gender		Experienced Participants
		Female	Male	
14	20-25	9	5	2
3	26-30	3	0	1
3	31-35	3	0	0

Test Metrics: The usability testing was done to measure 5 metrics as listed below:

    i.   Time taken to finish task
    ii.   Time taken to response
    iii. Time taken to key-in data
    iv. Success on task
    v.   Number of mistakes made while inputting data

Time taken to finish task, time taken to respond, and time taken to key-in data were metrics used to measure efficiency while success on the tasks and number of mistakes made while inputting data were metrics used to measure effectiveness. Effectiveness is the quality of a software interface that defines the extent at which users achieves their goals with completeness and accuracy on a software interface. Efficiency on the other hand is the quality of a software interface that defines the amount of resource (in terms of mental efforts and time, etc.) expended by users to achieve their goals with completeness and accuracy on a software interface [38-49].

Testing environment: The usability testing was carried out with a laptop per participant to record and capture the metrics along with the facial expression of the participants. The android mobile devices installed a screen recorder with audio, editor and screenshot. One of the most useful recordings the test facilitators captured was a video of screen activities, recording everything on the screen, pages scrolling, clicking links, typing of search terms, and so on. With the recording, the metrics of time taken to finish task, time taken to response, time taken to key-in data, number of mistake made while inputting data and how easy it is to find a function in

the mobile application were recorded. Figure 1 illustrates the test environment [50-53].

Fig. 1 Testing environment

Test Materials: In addition to the laptops, mobile phones, and the installed applications used. The following are other test materials used in the usability testing:

Test Tasks

A set of 5 task scenarios were prepared for participants, so that they can use them during the test. The task scenarios were provided based on the services that are offered in the GSC mobile application. The selected tasks include: i) download & install GSC apps, ii) register & login, iii) checking on movie list, iv) purchase ticket and v) FastTicket.

Questionnaire

The post-test questionnaire used had twenty items, divided into seven parts: participants' details, interface, terminology & application information, learning, application capabilities, general impression and overall reaction. This questionnaire used a 10-point Likert scale.

Test Protocol: During the testing, all participants performed usability testing at the same time and place. All paper materials, such as instructions, task lists and scenarios and checklists were provided and participants were helped freely where necessary while they were testing. Before conducting the test, the facilitator briefed and instructed participants on the conduct of the test. Then a pre-test questionnaire was given to participants to collect their demographic data, prior knowledge and experience. Based on a checklist, users performed each task, and then answered the post-test questionnaire. After the testing, there was a interactive debriefing session. The participants discussed their findings in the session. The topics of discussion and environment were video recorded to enable the participants' responses and behavior to be later analyzed.

Analyzing and preparation of reports: After the debriefing and post-test questionnaire session, the findings were analyzed and report prepared. The report included the scope and severity of problems captured in the test [45-51].

III. RESULTS AND DISCUSSION

Generally, all participants found that the GSC cinema mobile application is clear, straightforward and easy to use. However, the test also identified a few minor problems.

Details per task are as follows:

Task 1: Download and Install GSC application

1. Seventeen (17) participants successfully downloaded and installed the GSC mobile application in one minute.
2. No participant had problem with this task.

Task 2: Register and Login as a user

1. Three (3) participants took more than 3 minutes time to validate the registration account email.
2. Participants were confused concerning the advertisement in the front page and the menu list while trying to create account and login.

Task 3: Check on movie listing

1. Four (4) participants were confused and directly clicked on the movie menu list. They were supposed to click on the cinema menu as the task scenario instructed.

Task 4: Purchase ticket(s) and Task 5: FasTicket

1. No participant had problem doing this task. The task was easy and straightforward.
2. Furthermore, in the analysis, a one sample t-test was conducted and the test mean scores were compared with the population means. All comparisons were significant (see Table 3). The test recorded a 100% success rate as all study participants were able to accomplish and finish their tasks. The other results of the analysis are presented in Table 3 below:

Table. 3 Presentation of t-test Results

Metric	μ	Std	t(df); p-value	95% CI
Time taken to finish task	12.75 mins	5.93	6.796 (9); p = .00	(8.5024, 16.9876)
Time taken to key-in data	5.96 mins	2.85	6.615 (9); p = .00	(3.9218, 7.9982)
Time taken to respond	3.52 mins	4.22	2.641 (9); p = .027	(0.5050, 6.5390)
Number of mistake while inputting data	.02	.67	4.817 (9); p = .001	(0.5410, 1.4990)

As can be seen in Table 3, there were significantly fewer time taken to finish task compared to the population mean time to finish task, t (9) = 6.796, p = .00 < α = .01, 95% CI = (8.5024, 16.9876). Also, there were significantly fewer time taken to key-in data compared to the population time taken to key-in data, t (9) = 6.615, p = .00 < α = .01, 95% = (3.9218, 7.9982). In addition, the mean test time taken to respond was significantly lesser compared to that of the mean population time to respond, t (9) = 2.641, p = .027 < α = .05; 95% CI = (0.5050, 6.5390). Finally, there were significantly fewer number of mistakes made while inputting data compared to the population mean number of input data mistakes, t (9) = 4.817, p = .001 < α = .01, 95% CI = (0.5410, 1.4990). These results implied that the GSC mobile interface is both effective and efficient. This indicates that the GSC mobile application has good usability and provided users an enriching experience.

However, from the observations made by the facilitators, significant verbal comments were made by participants during their attempts to carry out the various tasks. The participants' facial expressions and body language while performing tasks reveal that some of them had some challenges. Features in the GSC app, such as choosing seats and making payment made some of the participants react uneasily and with caution because of their lack of confidence as it had to do with financial matters. Based on observation, most of the participants looked nervous and felt uneasy during the session. This was so even though a short briefing about the test was given to avoid such nervousness. Overall, participants completed their tasks.

IV. CONCLUSION

Based on the data collection and study result, it can be concluded that the GSC application is effective, efficient and easy to use. GSC application is an objectively usable app. It makes viewing and buying of movie tickets easier.

However, there are still a few features that need to be improved to enhance and increase users satisfaction and experience. The arrangement of menu on the application confuses users on the next step to be followed, especially the inexperienced users.

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