An Investigation of User Interface Feedback in Learning a Photography Technique

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Abstract— **This paper describes an experiment that evaluates the application usability concerning of two types of feedback, they are anthropomorphic and non-anthropomorphic. The aim of this research is to examine whether such approaches are effective or liked by the user. With regards to this, a tutorial prototype application specifically in learning a photography technique developed as a model for this experiment. An interface with video presentation is the anthropomorphic feedback and plain text presentation is the non-anthropomorphic feedback. The same procedure applied to both feedbacks. Statistical analysis results from an experimental study with 30 novice photographers revealed that anthropomorphic user interface feedback was effective and preferred by the users. At the end, this research will serve the focus group (photographer) on the best method effected them in learning a photography's technique as well as will serve the web or application developer an idea of guideline when developing a technical application.**

Keywords-Usability; Anthropomorphic; Learning; (key words)

I. INTRODUCTION

Usability of a system is important to make sure it can delivered well and satisfied by the user as well as helps to determine the success of a system being a usable product. Apparently, the emphasis of it is sometimes had been ignored and been take for granted. The main objective of this research is to help a better understanding on whether anthropomorphic type of interface adaptation is referred, satisfied and liked by the user purposely in a web application for photographers to learn some basic techniques in the field of photography. Hence, particular application is focused on evaluating anthropomorphic user interfaces to address the issue of satisfaction, liked and preferred of user interface based on their ease of use and ease of learning in relation to this context of study.

Investigation on anthropomorphic interface adaptation had been conducted by the researcher among various field of knowledge such as computer science as in, [1,2,3,5,6,7,8,9,13], engineering as in [2,3], education as in [10,11,12], arts as in [4] and others. Even though there were amount of research being conducted and explored in this area, there is still a room of argument on anthropomorphic user interface adaptation since the reality of this vision remains elusive. Therefore it is vital to have more researches in this area. Anthropomorphism is normally a form of design that allow designer to exploit something that can help a user to understand more about the context of presentation. Human-like application is the most applicable to be implemented [13]. However, in case of user interface, it usually involves assigning human characteristics or qualities or both to something which is not human [5]. To this, some human quality implemented into user interface [3] such as software agent or imitation of human character at user interface acting as a helper to user. Other than character, video of a human may also be categorised as anthropomorphic element at user interface [1]. Somehow, this is seen as how the user really comfortable to interact with the system. In the past ten years, a few studies by Murano, P, Gee, A., Holt, P. O. and Tuah, Noralisa Mohd as in [6,7,8,9] had been conducted on anthropomorphic and non-anthropomorphic preferences by the users in several contexts of study. In the context of web application or online system, [6,8] anthropomorphic user interface feedback was significantly more effective and preferred by the users.

Early study conducted by one of the authors [9] had investigated the effectiveness of anthropomorphic interface through character implementation in statistic tutorial system. In this study, both anthropomorphic and non-anthropomorphic feedback type were compared. Participants were provided a basic statistic tutorial system and they were assessed and marked based on a given time. The response was insignificant, however, based on participants' subjective opinion the anthropomorphic interface feedback was preferred by the user. In different with Prendinger, H., Mori, J., and Ishizuka, M [12], where they conducted a study on animated character (anthropomorphic) adaptation in quizmaster application (a mathematical game). The study was mainly aimed at finding how the presence of human-like elements (anthropomorphic) in a learning process can have an effect on the user's understanding, feelings and social interaction with the system.

Result has showed that, human-like interface gave a positive effect in users' perception in learning environment. Another conducted research by Hongpaisanwiwat, C. and Lewis, M. [14] had examined how the animated character with voice types could give effect to learner's comprehension and his/her attention towards performance, based on a multimedia presentation. This research examined the used of no character, non-anthropomorphic character and anthropomorphic character with synthetic voice and human voice application. The result was not in favour to support an animated character adaptation to be more effective than the others. However, it helped preserve users' attention.

Most of the conducted study on anthropomorphic interface in learning environment was mainly focusing on the users' perception and performance. Besides, the previous studies only investigate the effect into human-like character such as animated character, avatar and agent. Despite looking and searching for other contexts of study, the author of this paper would like to look further on a more technical way of learning which by reading will be very hard to be visualized.

In so many fields of study, technical topic is the base subject to be investigated because from previously conducted study [9], the level of learning is not significant enough to be concluded. Therefore, as suggested in [9], more technical subject should be investigated in depth since learning process on technical matters either by reading or watching will be interpreted differently. Photography topic is seen as one of a technical subject to be looked into because handling and using a camera as well as visualize and capture a memorable picture at the same time is hard to achieve. Chanlin [15,16] in her research on the use of animated aids in learning and the effects of visualization in learning experiences advocates that any form of graphics representation is complex and incomprehensible if the student/user had a limited domain of knowledge. To this, a subject of photography technique is chosen to be investigated by adapting a video presentation on web application. This research would like to examine which interface is more preferable by the novice user by looking at the feedback issue of effectiveness and satisfaction of the anthropomorphic and non-anthropomorphic interfaces. This can help a novice user to learn more in this context of study as well as aiming to improve the previous work conducted by one of the author's work [9]. Besides, by adding other case studies, but of a different nature from the initial studies, it will give some input to the web or application developer later on their design work.

In the remaining part of this research, there are two mains other sections. The next section describes the experimental process inspired by Rentróia-Bonito, M.A, Guerreiro, T., Martins, A., Fernandes, V., Jorge, J. [11], followed by the results and discussion. The final section is the discussion on research conclusions and ideas for future work.

II. EXPERIMENTAL PROCESSES

A. *Experiment*

The purpose of this experiment was to gather data regarding the system's effectiveness (quiz score) and user satisfaction on ease of use and ease of learning in how to use their camera and how to take a better picture based on basic given rules. Specifically the aim was to find out whether anthropomorphic user interface adaptations persuade a better experience with higher quizzes scored and given a good feedback from the user or not. Two types of interface feedback (prototype application) were tested – anthropomorphic and non-anthropomorphic. The anthropomorphic type was in the form of video and a website with plain textual content was the non-anthropomorphic type.

B. *User*

Participants for this experiment were photography student who involved in a youth photography program organized by Labuan Youth department. Data was collected by using questionnaire. Summary of participant:

- 30 participants, in various level of working background (not a professional photographer) took part in the experiment.
- Participant's age range was between 25 – 35 years old.
- All participants are novice photographers. They had a basic knowledge in photography and all of them were just involved in photography for less than three months and never been joining any formal photography class before.
- All participants had a basic knowledge of using a commonly used website such as Yahoo, Google, Youtube, Social Network pages and so on.

C. *Design*

A between users design was implemented for this experiment. 30 participants were randomly divided into two groups where each group (consist of 15 participants) tested one of the interface feedback type. The between users design was chosen because this would avoid bias in the experiment result in view of the fact that learning experience affected the way the task is carried out.

D. *Variables*

Two types of interface feedback and the type of task for each user group were the independent variables. Dependent variables were the participants' performance in performing the given task and their opinions. The dependent measures the performance by seeing whether the participant manages to complete all quizzes in given time and whether the participant manages to answer all quizzes correctly. On the other hand, users' opinion is measured using post-experiment

questionnaire. A specific and related questionnaire was designed.

E. Apparatus and Material

The experiment was conducted at two different rooms (provided by Labuan Youth Department). Each room was equipped with 15 laptops (the same standard and capabilities) with the installed prototype system where it is enough for every participant to conduct the experiment. The prototype system was developed using visual studio where simple html page is implemented. The Anthropomorphic interface required a web browser to be installed with video codec plug-in. Each of the participants was provided a pen and a sheet of paper for them taking notes.

Two questionnaires were used in this experiment. One was given at the beginning of experiment. This questionnaire is about user demographic information containing user background, photography's knowledge and experience and level of computer literate. The other questionnaire was distributed at the end of the experiment for eliciting subjective opinion regarding the system interface and its performance, the quizzes and the participants' feeling during the interaction. This is using likert type scales, 1 (poor) – 5 (the best) based on given criteria.

F. Procedure and Tasks

The first step was to ensure selected participants are suitable candidates for the experiment by determining the participants' background and experience fulfilled the selected criteria. It is a must that the sample should be new in photography. This was because the developed prototype covered the topics for beginners in photography such knowing your camera, basic rules in photography and how to take a better photo. The result was reflected from the first questionnaires.

The created procedures ensured every participant was treated the same to minimize bias to the experiment. Participants were randomly divided into two groups (group A for video based interface and group B for text based interface) and each group was placed in different room. The participants were given a brief introduction mainly to explain the purpose and nature of the experiment followed by instruction on how the experiment would be done. The explanation on purpose of this experiment helped clear up their mind that this is not about to examine them. The next step required each participant to complete the first questionnaires before experiment took placed. They were given a pen, a sheet of plain paper and printed task sheet for their reference.

After that, a short tutorial was given to them. This tutorial explained what and how the system worked and steps they should do in the experiment. Once the participant was ready the experiment began. It started with listening to or reading (depending on experimental type) the tutorial where it will be the question in the quizzes later. When they were done with the tutorial section, they were given a sheet of paper containing 20 multiple choice questions and have to be completed at most 20 minutes. Quiz to be done unaided. The real experiment is one-to-one basis. Therefore, participants were observed and any related raised issue was recorded manually. Completion time and quiz's mark for each participant was recorded manually.

At the end of the experiment, participant completed the second questionnaires. This questionnaire was in view of participants' subjective opinion. Once questionnaires had been completed, the participants were served with lunch in return for their participation.

G. Result

The obtained data for this experiment was statistically analysed concerning with the effectiveness and satisfaction. The effectiveness data were analysed by using a t-test for between users design; and satisfaction based on user's subjective opinions were analysed through means and standard deviations.

The first issue is effectiveness. The score obtained from quiz questions (number of the correct answer) and number of user who manage to complete the task on given time were each analysed by means of a t-test. The result has shown a significant result.

For 30 participants, 15 participants using anthropomorphic interface feedback (Video Interface) and the other 15 using the non-anthropomorphic interface feedback (texts). The data gathered for quiz questions showed a t-Observed of 1.98 and the t-critical ($p<0.05$) was at 1.69. Table 1 below show the statistic:

TABLE 1: T-TEST RESULT OF VIDEO VS TEXT FOR QUIZ QUESTIONS

t-Observed	1.98
t-Critical	1.69

The data gathered for number of user who did not managed to complete the task on given time showed a t-Observed of -0.98 and the t-Critical ($p<0.05$) was at 1.69. Table 2 below show the statistic:

TABLE 2: T-TEST RESULT OF VIDEO VS TEXT FOR COMPLETE TASK WITHIN TIME

t-Observed	-0.98
t-Critical	1.69

The second obtained data were about subjective opinions on level of the quiz question, opinions on the user interface and its components, and the participants' feelings during the interaction. The data gathered from second questionnaires using Likert type scales, 1-5, where 1 reflected

the most negative opinion and 5 reflected the most positive opinion. Table 3 below illustrates the means and standard deviation (SD) for each of the related issues being tested based on the two types of interface feedback.

TABLE 3: MEANS AND SD PARTICIPANTS' SUBJECTIVE OPINIONS FOR TUTORIAL ELEMENT

Anthropomorphic Feedback type (Video)	**Mean**	**SD**
Tutorial Content	4.73	0.46
Tutorial Clarity	4.67	0.49
Quiz Clarity	4.67	0.49
Level of questions	4.53	0.52
Non-Anthropomorphic Feedback type (text)	**Mean**	**SD**
Tutorial Content	4.67	0.49
Tutorial Clarity	4.47	0.51
Quiz Clarity	4.67	0.49
Level of questions	4.47	0.51

TABLE 4: MEANS AND SD PARTICIPANTS' SUBJECTIVE OPINION FOR SYSTEM USEFULNESS

Anthropomorphic Feedback type (Video)	**Mean**	**SD**
Helpfulness on Screen Appearance	4.8	0.41
Precise Instruction	4.67	0.49
System's Appealing	4.67	0.49
Content Structure	4.67	0.49
Non-Anthropomorphic Feedback type (Text)	**Mean**	**SD**
Helpfulness on Screen Appearance	4.73	0.46
Precise Instruction	4.53	0.52
System's Appealing	4.47	0.51
Content Structure	4.47	0.51

13 over 15 participants (group A) gave a positive response to the implementation of the anthropomorphic interface feedback (video) if it made available elsewhere. However, 9 over 15 participants (group B) also gave positive responses to implementation of non-anthropomorphic interface feedback (text) if it made available elsewhere.

H. Discussion Of Result

The analysed data for the two measurable variables on performance basis, number of correctness of quiz question (at t-observed = 1.98) and over times taken to finish up the quiz (at t-observed = -0.98), had showed a significant result for the experiment. It showed most of the participants for anthropomorphic interface feedback (video) had answered most of the questions correctly and had managed to answer the quiz within the given time.

The reason might be because of the interface and system's presentation for anthropomorphic interface feedback (video) was very helpful in terms of interaction and learning the tutorial compare to the presentation on non-anthropomorphic interface feedback (text). Besides, the effectiveness of tutorial material (reflected from the quiz score) for anthropomorphic interface feedback (video) had better impact on their knowledge compares on non-anthropomorphic interface feedback (text). The results also effected from the recruited participants. Even though the sample size should be larger however, the target participants were ideally concentrated on the right group where it could be reduced the differences of bias result.

For the subjective opinions by participants, the obtained result has significantly indicated the anthropomorphic interface feedback (video) were more preferred than non-anthropomorphic interface feedback (text). This was referring to the tutorial element and the system's usefulness and its component. One aspect could explain the result was the tutorial content and clarity that motivate them and improve themselves in this context of study.

One important feedback noted while observing them during the experiment was the anthropomorphic interface feedback (video) need more concentration, listening carefully, wrote down some notes and alert to what the video was saying. Besides, few of them had repeated the video 2 or 3 times in order to catch up the tutorial. Therefore, an extra effort is needed even though they said that they were enjoying the system. However, the situation was different with the non-anthropomorphic interface feedback (text), they need to read and understand what the contents meant. This shows a less effort yet more stressful than the video-based interface in order to complete the experiment.

III. CONCLUSION AND FUTURE RECOMMENDATION

The obtained results were in favour to indicate that the anthropomorphic interface feedback was preferred on this context of study. It shows that in an educational line, anthropomorphic interface could help to improvise the way of learning. Besides of adding something into this field of study (tutoring and anthropomorphism) the significance of this research also being seen as a guide and tool to help system developer to design a specific interface for related system application.

This experiment helps the instructor to design a better approach of learning as well as a variety in teaching

environment to get a better understanding towards the context of study particularly in learning photography.

The experiment had been conducted to examine the level of understanding and perception of the respondents towards the preferred application with extra features (video-based) than one without it (text based) as every person will response differently. In addition, learning interactively such through watching and listening require more concentration from the respondents than learning through reading [12,16]. Thus, the need of notes taking and reading will help to increase the percentage of learning.

However, the need for further researches is vital before conclusion in this context of study especially in 'tutoring' purposes is made. Based on previously conducted research [9] done by one of the authors of this paper, some improvement had been made such as, strengthening the recruitment process, used different method of procedure and enhancing the prototype system to more advanced concept. Nevertheless, further aspect on human-like presentation that has relation to cognitive, interaction design, learning material could be studied in future research.

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