Edutainment in E-learning Interfaces

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Abstract: Researchers have articulated that humour increases students’ performance in learning environment combined with amusement features. This paper describes an empirical investigation about the role of edutainment using avatars as tool to represent the entertainment attributes in an e-learning framework. The empirical investigation aimed at measuring usability of two experimental interfaces: typical e-learning and multimodal e-learning system. The usability of these two environments was analysed by one dependent group of users. The outcomes showed improvement in learning with the edutainment interface more than the typical version.

Key-Words: Avatar, E-learning, Edutainment, Human Computer Interface, Multi-modal Non-edutainment.

1 Introduction

Improvement in modality integration and other techniques encourage the development of combined systems (multibiometric-multimodal-multisensor) that can help translate the users’ natural language and activities in a range of challenging real-world contexts [1]. The result is the invention of new interfaces utilised in any circumstances and situations when required [1]. On the other hand, researchers emphasize the role of entertainment and pedagogical factors, which complements the learning process [2-5].

In this direction of integration, edutainment appeared as an area which is adapting multimedia interaction methods to produce educational learning materials in some kind of entertaining forms. Savidis [6] described edutainment as “pleasure or positive experiences that a learner hopefully desire. The pleasure can result not only from the entertaining and interesting content itself, but also from the entertaining and interesting content itself, but also from the satisfaction of getting problems solved especially in games”. As edutainment is a combination of entertainment and education, this integration is mainly to create a motivating and successful environment for learning. Edutainment had been implemented in games software including all type of electronic games like computer games, console games, portable and handheld games. Many programs on TV that submits effective educational subjects via entertainment means for children, for example Sesame Street could be classified as edutainment [7]. Examples of websites that educate and entertain in the same time are Learn2.com, Serious Game, Simulearn, Games2train, MBA Games, and HowStuffWorks.com [8]. However, in this study the users will be entertained mainly with human like avatars conveying the knowledge with multimodal metaphors in interesting and entertaining way. The main purpose is to improve learning in e-learning systems in general and also to contribute in developing guidelines for avatar involvement in the context of edutainment.

2 Previous work

One particular study [9] demonstrates the use of streaming multimedia narratives in web entertainment. The idea is to make users stop or navigate through hot links that lead to extra information, whilst watching entertaining and engaging cultural tours which stream continuously for several minutes. By quantifying the number of mouse clicks, the results showed that the users who clicked more times reported less entertainment and engagement. That is what the author called the "less clicking more watching" design approach. The research also recommended that the maximum time that the users can watch is around 5 minutes. The study summarized later that web entertainment can be passive and the approach suggested somewhat benefits the users and it can be a design guideline for at least one domain [9].
A further work [10] conducted on bio-edutainment VR-enhanced bio-molecular education using a gaming model. 3D visualized environment, 3D audio, protein music, and 3D gaming interface integrated to form 3D edutainment VR game for bio-molecular learning. This game environment enables the player to discover important protein structure. With the game devices incorporated, players can have better interaction with virtual bio-molecular world during their learning process. Students can repeatedly play the game as many times as they wish. Developed tool can be used to handle all bio-molecules in Protein Data Bank (PDB) with their structure determined by X-ray crystallography. Moreover, playing X games allow all age levels of students to learn bio-molecular structure and also it helps to understand complex structure of bio-molecules (Proteins). Experiences accumulated by users during playing this type of games, helps to develop their curiosity and skills to explore the complex world of science [10].

Seeing that, there is no doubt that edutainment is the field of today technology assembling to enhance interactivity and stimulate creative thinking. Also the pedagogical aspects cannot be neglected as result of educational features included in the edutainment programs. In spite of that, the area requires further research, more investigations and extra verifications, since the field is too large and open to all scientific and non scientific disciplines.

3 Experimental platform
The empirical investigation aimed at measuring usability of two experimental interfaces: typical e-learning and multimodal E-learning system, in terms of efficiency, effectiveness and satisfaction. Both systems are similar in terms of content and number of tasks.

Table 1 shows the features incorporated in both interfaces. Each platform contains two chapters (Case1, Case2) in which difficulty gradually increases from case 1 to case 2. To avoid any familiarity with the topic and the interface sampling in the experiment, random rotation technique was applied between platforms and also in terms of chapters (Cases). Tasks divided to 2 groups, one is recognition questions and the other is recall type, and also here tasks increased in term of difficulty (easy-moderate - hard).

The user must use both interfaces and they have to decide which interface is better and enjoyable through feedback. The study targeted high level educational students (Master & PhD Students), and the subject matter examined as e-learning content was Human Computer Interaction (HCI).

Considering that, HCI as subject matter is mainly theoretical. Learners need something to watch and listen to improve their imagination and engagement.

<table>
<thead>
<tr>
<th>Users</th>
<th>Edutainment</th>
<th>Non-Edutainment</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Case 1 : T1, T2, T3, T4, T5, T6</td>
<td>Case 1 : T1, T2, T3, T4, T5, T6</td>
</tr>
<tr>
<td>10</td>
<td>Case 2 : T1, T2, T3, T4, T5, T6</td>
<td>Case 2 : T1, T2, T3, T4, T5, T6</td>
</tr>
</tbody>
</table>

Table 1 Tasks rotations

To achieve this goal, an idea employed was to adapt Avatar (sound and human like expressions) as an assistance tool to convey the message to the student by incorporating amusing elements such as jokes, facial expression and body gesture. The word avatar comes from the Sanskrit language [11] and can be translated as God’s Incarnation on Earth. In the virtual reality community, avatars are 3D humanoid characters inhabiting virtual space, with varying degrees of animation and behavioral abilities. Avatars typically represent humans who visit the space virtually. Each visitor controls their avatar and is aware of other visitors’ avatars and their actions. The avatar moves and gestures in the mirror as the experimental subject moves and gestures in the physical room [11, 12]. Furthermore interesting possibilities can be offered by avatar world for online learning, collaboration, discovering new environments and attract learners to keep progressing.

The plan is to employ the avatar to read to the user the subject matter and to entertain the learner by jokes, gesture, facial expressions Fig. 1.a. After the user has finished the training parts within the specific case, they are then examined to test how much they have memorised. Fig. 1.b shows a snapshot for multiple questions type. In this type of exercises the questions are represented by 4 labeled boxes. First box usually is for questions labeled (Q1, Q2, Q3…), the rest are for answers labeled (A1, A2, A3…). Once the user clicked what he/she believes to be the correct answer, an entertaining short message appears as positive or negative feedback. This response was represented by some kind of funny avatar gesture accompanied with short amusing text and sound massage.
Fig. 1 Snapshots of experimental tool for edutainment platform (a) Avatar as teacher reading the materials to the student (b) Example of negative feedback (c) Example of positive feedback.

Fig. 2: The percentage of correct answers for platforms (E&NE), task, questions type, case condition.

In addition the system designed to jump to the next question automatically in case of correct answer, if not, after three attempts for each question, the system allows the user to go to the next question, considering the result incorrect. When the student provides no action for several seconds (approximately 30 seconds), the program launches immediate humorous prompt as seen in Fig. 1.c.reminding the user by his/her slow act in taking a decision, which is in turn to motivate the client to take faster action.

4 Results and analysis

The experiment was carried out over a 4 weeks period in the Bradford University research laboratory. Overall 44 volunteers took part in the study. All participants used both edutainment (condition E) and non-edutainment (condition NE). The condition (E and NE) was distributed randomly but was the same within each user.

Fig.2 shows the mean correct answers for condition (E) was higher than the average of condition (NE), 63.63% and 43.56% respectively.
On the task level, participants whom answered tasks correctly given in condition (E) were 22.73%. In contrast, condition (NE) was 13.64%. Regarding each task by its own it was obvious that the correct answers decreases gradually in direction of recall tasks for both conditions. These results illustrated in Fig.2.

Variation between users performance for both conditions (E & NE) in terms of cases regardless of task type are noticed during the experiment session. Taken average of correct answers for case 1 (case 1 for both conditions E & NE), compared with case 2 (case 2 for both conditions E & NE) is illustrated in Fig.2. The average for case 1 was 61.74% and case 2 was 50.88. This gives us indication that case 2 is more difficult than the first case.

The Fig.2 depicts also the percentage of correct answers by users for recognition and recall questions in both conditions, the average for condition (E) for recognition type was 71.76%, whereas in condition (NE) was 61.36%. In contrast, recall category was significantly low, it observed in condition (E) 53.78%, and condition (NE) 35.60%.

4 Memorability
Expressions identification (Memorability) of the post-experiment questionnaire was conducted. Participants were given 2 expressions (Avatars facial expression), then asked them to select the correct expression that have been experienced in the experiment session. For example if the avatar in the questionnaire expressed the positive action, the user should choose happy mode which the avatar has taken when users responded right. The feedback depicted that 70% of participants recognized the expression easily, whereas 22% answered wrong and only 8% refused to answer.

6 Interface preferences
The study provided by direct question requested from the users in the end of post-questionnaire to articulate the preferred platform experienced. The final statistics demonstrated that 80% of users preferred the condition (E).

7 Discussion
Although 18% had excellent knowledge about HCI, the average of correct answers in general was satisfied. Results showed that the variation between conditions as well as tasks is significant, condition (E) was 63.63%, and condition (NE) was 43.56%. On the level of tasks, condition (E) was 22.73%, condition (NE) was 13.64%. These significant statistics are maintaining participants’ excellent performance in condition (E). Also reported brilliant reply to specific question that was asked regarding whether edutainment increasing user attention and performance or not. Though enhancement is observed in condition (E) were students’ preserved the knowledge given longer period of time, which can be referred to entertainment practice experienced.

Concerning the platforms as a whole, supplementary results indicated generally that 70% of participants recognized easily the facial expression provided by avatar, whereas 22% answered wrong and only 8% refused to comment. Although 56.81% of participants had no knowledge about avatar expressions, an amazing observation was, users easily distinguished between happy and sad expressions when introduced after right and wrong answers. Consequently the outcome determined that the avatar conveyed to the users emotional expressions effectively. This is encouraging the continuation of investigating fun with e-learning systems.

Finally, 80% of users preferred the condition (E) when asked about their opinion for the two conditions regardless of subject matter and if they responded correctly or not.

4 Conclusion
This paper introduced correctness attribute which was a part of results obtained from the first experiment. The aim was to study the effect of combination of education and entertainment communicated to students through avatars. The outcomes presented showed improvement in users’ effectiveness and enjoyment. Further tests will be conducted throughout sequences of experiments to improve usability problems within edutainment interfaces.

References:


