

HCI Aspects to Teaching Primary School Children the Islamic Prayer

Mohammed Farsi

School of Engineering and Computing Sciences, Durham University, England, UK
moahmed.farsi1980@gmail.com

Abstract. A fundamental objective of Human-Computer Interaction (HCI) is to design a system that provides the user with a positive experience. This is achieved by matching the experience with the user's personal aims and goals. This study adopts a Virtual Environment setting for teaching the Islamic prayer to primary school children.

Keywords: Human-Computer Interaction, Virtual Environments, Islamic prayer, Kinesthetical learning, X-Box 360 Kinect, Learning preferences.

1 Background and Objectives

A fundamental objective of Human-Computer Interaction (HCI) is to design a system that provides the user with a positive experience. This is achieved by matching the experience with the user's personal aims and goals. This study adopts a Virtual Environment setting for teaching the Islamic prayer to primary school children. The iIP software (Interactive Islamic Prayer) has been designed for the Xbox 360 Kinect, covering the various movements of the prayer in sequence without the use of a controller. The Microsoft's Kinect for XBOX 360 is a more recent and progressive form of VE, which employs markers to recognise, capture, track and decipher a user's movement through infrared technology (DePriest & Barilovits, 2011). This has been described as a "revolution in the making" as the method of interaction between human and computers is no longer bound by tangible objects like a controller, mouse or keyboard (Hsu, 2011). In doing so, the objective is to focus on specific HCI elements within the iIP software that would facilitate a "user-friendly" experience for the students, through direct interaction of mimicking the displayed movements during the prayer.

2 Method

30 primary school children and 3 teachers were asked to evaluate their overall experience of the iIP software from an HCI perspective. Through a quantitative analysis of the participants' learning experience, this study investigates the importance of HCI in the design and development of the training software, particularly in relation to those

that adopt a Virtual Environment setting. As part of the data analysis, questionnaires were given to the participants to evaluate the usability, usefulness and overall learning experience of the iIP software.

2.1 iIP Software

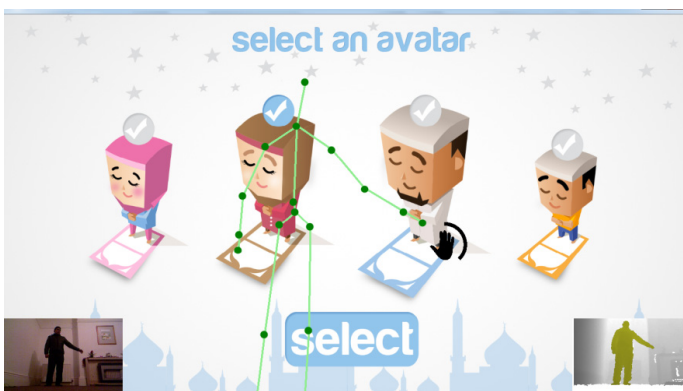
The iIP software consists of various screens and levels, which guide the user through the Islamic Prayer.

Start Screen



Users begin with the start screen to enter the training software. The user must place and keep their right hand over the “Start” button for approximately 3-5 seconds until the loading bar is complete.

The Main Screen



The main screen introduces the user to the iIP where learners can first choose their instructional avatar. They do so by placing and keeping their right hand over the character until the loading bar has completed.

Level Examples



Level 1 is the first position of the Islamic prayer, where the user must stand upright. The user is given instructions on what to do, as well as watching their instructional avatar.



Level 3 is the third movement of the prayer – placing the hands on the chest

It should be noted that the instructions inform the learner where they must look or what they must read, however the software will not pick up on these particular aspects.

2.2 User Interface Components

As highlighted in the storyboard, the Level stages are the main part of the software. From a GUI perspective, they maintain the same format and layout and are ultimately used to ensure the user experiences a positive learning experience. Kolb (1984:38) refers to the learning experience as the “process whereby knowledge is created through the transformation of experience”. This is therefore vital to any study involving education and learning, as it will determine whether or not the HCI element of the iP software can help develop the participants in learning the prayer. Figure 4.3 demonstrates key components of the GUI for the Level screens:

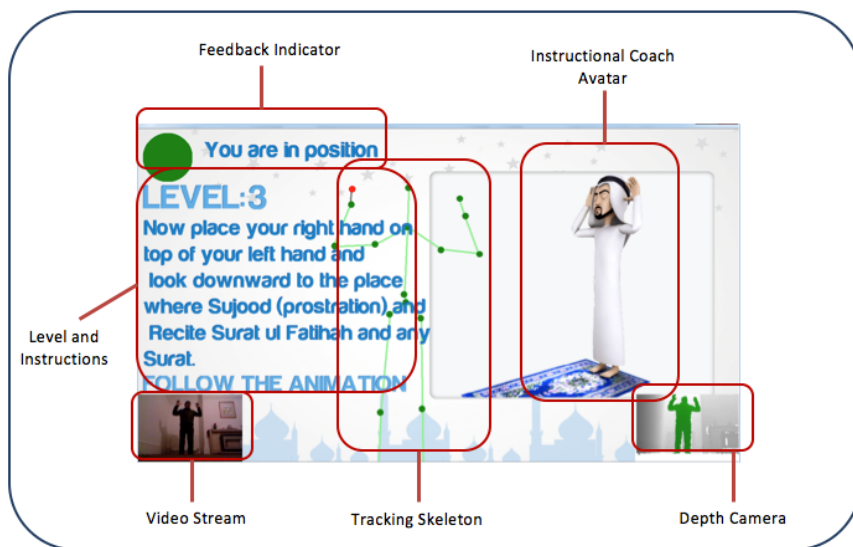


Fig. 1. Main components of the GUI for the Level screens

2.3 Instructional Coach Avatar

To aid the users in how to perform the various prayer components correctly, an instructional avatar is positioned on the screen throughout the Level screen from the beginning to the end of the prayer (Figure 4.3). In the Main Screen, a selection of avatars has been designed, so user has the option to select their preference. The choices have been designed to suit all audiences including younger or older males/females. Similar to the design used in Charbonneau, Miller and LaViola (2011), the procedure for each specific movement of the prayer will be achieved by splitting the display screen into two halves; one showing a detailed instructional tutorial video of the desired movement. The other half will be the user's avatar that will track and display the movements of the user. The goal will be for the participant to follow and complete the movement as shown on the instructional tutorial. Utilising the constructivism approach described by Benson (2011), the participant will continue to build upon previous knowledge and movements until the whole prayer is complete. This makes the user feel that they are a part of the software, which in turn elevates their learning experience. The remaining screens show the movements that the users will be instructed to complete in order to complete one unit of prayer.

2.4 Levels and Instructions

Upon selection, the instructional avatar will then begin to perform the prayer movements. The user can also read the instructions, which reinforces the visual aid from the avatar. The instructions are both clear and concise for easy comprehension. Moreover, the Arabic phrases that are used throughout the prayer have been transliterated for English speaking audiences in case they are unfamiliar with Arabic.

2.5 Video Stream and Tracking Skeleton

In order to aid the user in assessing whether they are performing the movements appropriately and accurately, the iIP software uses two specific means for tracking. The first means is the video stream is a real-time camera built-in the hardware that captures the users' actions, while the second is from the tracking skeleton (see figure 4.3). From an HCI perspective, the former enables the users to apply the camera like a mirror, which shows them exactly what they are doing and whether they are mimicking the interactional avatar correctly. Similarly, the tracking skeleton provides a deeper insight for the user, as it pinpoints all the relevant joints of the user. This is important during each movement, in order for the user to ascertain exactly which joints are in the correct position or not.

2.6 Feedback Indicator and Tracking Skeleton

Due to the nature of VE, Miles et al, (2012) illustrate not only the importance of providing feedback, but the effectiveness it offers in collating and analysing data on user performance. Furthermore, Eaves et al's (2011) investigation on using VE for motor skills in dance, found feedback drew the participants' attention to specific actions that were required to be learnt. In terms of formative assessment, this will occur in real-time when the participant attempts to perform each prayer component. The participant will receive immediate feedback, whereby the software will inform them if they have succeeded in the movement, focusing attention on accuracy and timings. This is done through the use of visual and auditory aids, in the form of a green or red light in the corner of the screen and a sound to indicate the movement has been performed correctly (Figure 4.5). Furthermore, if the participant has not fulfilled the appropriate requirements, the program will ask them to repeat the movement; hence, it will not continue until the user has completed each task. Miles et al (2012) refer to this as guidance and informative feedback, which guides users to the correct body movement and provides statistical information on performance respectively. Kelly et al (2010) also used informative feedback in VE in a difference context, namely for training and improving golf swings. The design was similar to that mentioned above, whereby a "coach" avatar displayed guided movements that the user could mimic and compare.

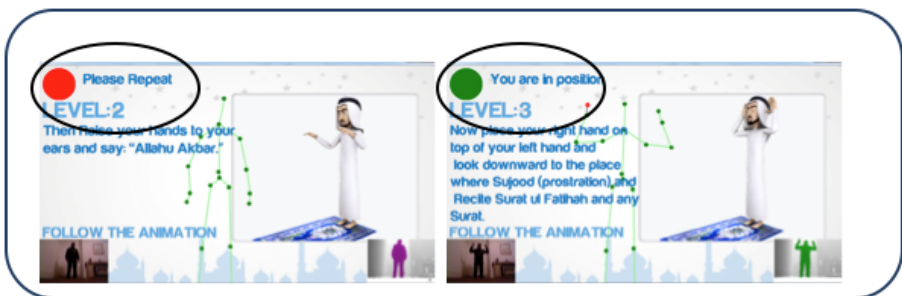


Fig. 2. Red and Green indicator (and caption)

Moreover, if a joint is not recognized or is in an incorrect position, it will turn red to notify the user. This can however be a limitation of the software, because it occurs when joints overlap one another or are interconnected, which are necessary during the prayer (i.e. placing the hands on the knees or placing one hand over the other).

3 Conclusion

From a preliminary study, the results revealed positive feedback from the participants, who indicated they were extremely satisfied with their overall experience in using the iIP software. The students found it fun, educational and easy to use, whilst the teacher felt it was a valuable alternative in teaching the prayer.

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