Computers & Education 59 (2012) 710–721

Contents lists available at SciVerse ScienceDirect

Computers & Education

journal homepage: www.elsevier.com/locate/compedu

The effect of emotional feedback on behavioral intention to use computer based assessment

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ARTICLE INFO

Article history:
Received 27 June 2011
Received in revised form
29 February 2012
Accepted 6 March 2012

Keywords:
Emotional feedback
Computer based assessment acceptance
Perceived playfulness
Behavioral intention
Perceived usefulness
Perceived ease of use

ABSTRACT

This study introduces emotional feedback as a construct in an acceptance model. It explores the effect of emotional feedback on behavioral intention to use Computer Based Assessment (CBA). A female Embodied Conversational Agent (ECA) with empathetic encouragement behavior was displayed as emotional feedback. More specifically, this research aims at investigating the effect of Emotional Feedback on Behavioral Intention to Use a CBA system, Perceived Playfulness, Perceived Usefulness, Perceived Ease of Use, Content and Facilitating Conditions. An appropriate survey questionnaire was completed by 134 students. Results demonstrate that Emotional Feedback has a direct effect on Behavioral Intention to Use a CBA system and on other crucial determinants of Behavioral Intention. Finally, the proposed acceptance model for computer based assessment extended with the Emotional Feedback variable explains approximately 52% of the variance of Behavioral Intention.

1. Introduction

Previous studies showed learners' preference on CBA procedures (Croft, Danson, Dawson, & Ward, 2001; Ricketts & Wilks, 2002; Sambell, Sambell, & Sexton, 1999). The main reasons that learners are pleased with CBA are the following: 1) learners are able to take the assessment anywhere and anytime through a computer. 2) They are also able to take the test as many times as they wish as long as this service is provided. 3) They feel more assured regarding the results' accuracy and fairness since the computer does not care who the test taker is. 4) They are able to see their results as soon as they complete the assessment (Bocij & Greasley, 1999; Cassady & Gridley, 2005). 5) CBA provides them immediate feedback to identify their strengths and weaknesses (Crippen & Brooks, 2002; Gretes & Green, 2000).

Instantaneous or immediate feedback is very important to learners. Educators may use feedback strategies to help learners during the CBA. Feedback could support learners to create knowledge and abilities. Feedback in education has to do with the educator's responses to the learner's actions, thoughts, emotions, needs, attitudes, wills, intentions etc. (Economides, 2006a). Feedback is also useful to guide and support learners during CBA (Thelwall, 2000). It may also try to improve the learner's strengths, performance, and to reduce his/her weaknesses (Economides, 2006a; Wilson, Boyd, Chen, & Jamal, 2011).

A case of immediate feedback is emotional feedback. Emotional feedback has been developed to regulate learners' emotional states towards learning. Prior studies showed that positive emotions enhance problem solving and decision making, leading to cognitive processing that is not only flexible, innovative, and creative, but also thorough and efficient (Isen, 2001; Isen, Daubman, & Nowicki, 1987). On the other hand, negative emotions have been shown to impede performance on learning tasks (Izard, 1984). Moreover, previous studies regarding emotional feedback investigated the implementation and evaluation of emotional regulation strategies concerning the management of learners' emotions and behaviors (Beale & Creed, 2009; Burleson & Picard, 2007; D′ Mello et al., 2008; Robison, McQuiggan, & Lester, 2010).

However, to the best of our knowledge previous studies did not connect the use of emotional feedback with the acceptance and the intention to use a CBA. Thus, the goal of this paper is to identify the effect of emotional feedback on learners' behavioral intention and on

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doi:10.1016/j.compedu.2012.03.003

other crucial variables regarding CBA acceptance. Based on previous studies on technology acceptance and especially towards learning and assessment systems' acceptance, we developed a research questionnaire to evaluate the effect of emotional feedback on CBA's acceptance through a causal model.

2. Literature review

2.1. Computer based assessment acceptance

Computer Based Assessment Acceptance Model (CBAAM) has been proposed regarding the acceptance of a CBA (Terzis & Economides, 2011). CBAAM have adopted variables from previous studies in order to define Behavioral Intention to Use a CBA system. Particularly, it has adopted Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) from Technology Acceptance Model (TAM) (Davis, 1989). Furthermore, from Unified Theory of Acceptance and Use of Technology (UTUAT), it used Facilitating Conditions (FC) and Social Influence (SI) (Venkatesh, Morris, Davis, & Davis, 2003). In addition, from Social Cognitive Theory (SCT), it has implemented Computer Self Efficacy (CSE) (Compeau & Higgins, 1995). Moreover, it adopted Perceived Playfulness (PP) by Moon and Kim's (2001) research study. Furthermore, CBAAM included variables which were found to be more relevant with the context of learning and assessment acceptance. It proposed firstly Goal Expectancy which is based on Self-Management of Learning (Wang, Wu, & Wang, 2009) and secondly Content.

The aim of this study is to further investigate the factors affecting learners' CBA acceptance by introducing feedback and especially the immediate emotional feedback as a determined variable of learners' behavioral intention to use a CBA.

From CBAAM, SI, CSE, and GE variables excluded from the analysis of this study. These variables are expectations and opinions that learners already had formed before the interaction with CBA system and Emotional Feedback. Therefore, an impact of Emotional Feedback on these variables can not be measured.

The type of feedback is essential to our study, thus the literature review continues with an extensive analysis of feedback and especially of the emotional feedback provided in this study through Embodied Conversational Agents (ECAs).

2.2. Feedback

Feedback is a very powerful tool during learning and assessment procedures (Harlen & James, 1996; Porter & Brophy, 1988). Especially in computer based educational environments, the proper use of feedback is very important for learners since most of the time learners use these computer based learning platforms on their own without any help and support by a real person tutor (eg. Macdonald, 2001). Thus, feedback in computerized learning and assessment context replaces in some way the tutor. Many different types of feedback have been proposed. Feedback classification is basically connected to two characteristics: 1) "when" feedback is triggered (in advance, immediate and delayed) 2) the context of the feedback targeted to one of the three different mind dimensions (Cognitive, Emotional and Conative) (Economides, 2009).

There are also other feedback features that could be used so as to distinguish various feedback types (Hattie & Timperley, 2007). Such a characteristic is the reason and cause that activates a feedback. Other features include the result, the effect and the outcome that a feedback will produce. Another differentiation could emanate from the pedagogical method that a feedback is based on such as: 1) Reward (positive), 2) Neutral, or 3) Punishment (negative) (eg. Hodges, 2004). Furthermore, the multimedia type of the feedback: text, pictures, audio, video, etc. (eg. Alexander, 2001) could serve as a distinguishing feature. Other feedback characteristics include frequency, duration, interactivity, personalization and educational context. Most feedback types include all or some of the previous characteristics.

2.2.1. Immediate feedback

In this experiment we used immediate feedback, in order to stimulate students' instant emotions. Previous studies have shown the positive impact of immediate feedback on students' learning achievements (Wang, Wang, Wang, Huang, & Chen, 2004). Furthermore, Chickering and Gamson (1987) supported immediate feedback as one of the most effective practices in undergraduate education.

2.2.2. Emotional feedback

Emotional feedback is provided to learners so as to ameliorate their emotional states during LMS and CBA. Contemporarily, researchers are able to measure and recognize learners' current emotional state through special equipment and emotional recognition methods. The core channels/methods for measuring emotions through special equipment are the following: 1) speech recognition, 2) physiological data, and 3) facial expressions.

Several studies proposed a number of universally recognized facial expressions for recognizing emotions such as happiness, surprise, fear, sadness, anger and disgust (Robison, McQuiggan, & Lester, 2008). Therefore, estimating emotional experiences from objectively measured facial expressions has become an important research topic. Other facial recognition systems employ advanced video-based techniques (Davis, 1996) or measure the electrical activity of muscles with EMG (facial electromyography) (Burleson & Picard, 2007).

Moreover, researchers, based on learners' recognized emotions, have integrated emotional feedback capabilities into tutoring systems (Economides, 2006b; Moridis & Economides, 2008). Humor, expressions of sympathy, empathy, reward, pleasant surprises, encouragement, acceptance, praises but also criticism (Economides, 2005) are some of the possible actions that could be practised by a testing system. Each one of these emotional feedback practises could be used in a learning system alone or combined, depending of the desired effects and results.

2.2.3. Empathetic behavior

An ECA was used as a means of displaying emotional feedback, so as to examine the connection of the use of emotional feedback with the acceptance and the intention to use a CBA. Since the ECA employed empathetic behavior to regulate students' emotional states, this kind of behavior has to be further analyzed, before continuing with the main focus of this work.