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Proposed features of an online examination interface design and its optimal values



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ABSTRACT

User Interface Design is an essential part of any software application. Accordingly, online examination is an equally important system within eLearning. Consequently, online examination design features are a significant factor in enhancing exam efficiency as well as convenience for examinees. Nine main design features are generally applied in the online exam, namely font (i.e., type, size, colour, and style), background colour, sound alert, questions group, time counters, and number of questions per page. The values of these features are closely related to user characteristics, whether relating to the physical, cognitive, psychomotor, demographics or experience. Our experiment was conducted on 119 students to identify the commonly preferred online examination design. The results show that the students had variations in their choice of online exam interface design, where students preferred to group questions by Topic and then by Type. The most popular font type was Arial with a size of 14 or 12 and using regular font style. Moreover, white background and black text were the most preferred. Most of the students selected 5 and 3 questions/page respectively. Countdown Timer was the most preferred time counter. Regarding sound alert, the 15 and 5 min remains were the most selected by students.

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1. Introduction

The growth in online education over the last few years has been marked by a competitive academic environment (Stowell & Bennett, 2010; Trenholm, 2007). Moreover, a new concept that has emerged from the World Wide Web is eLearning (Alavi & Leidner, 2001). The phenomenal growth of eLearning can be attributed to the fact that it is a financially viable venture for institutions. In fact, according to a new report by *The Global Industry Analyst* (Xiao & Ji, 2011), the eLearning market is projected to reach \$107.3 billion by 2015.

Computer technology has proven itself to be generally useful in the field of education, in particular, as teaching and learning tools. In terms of the evaluative phase of the teaching-learning process, online examination is an increasingly important component of online courses. Generally, an examination or a test is a tool that evaluates knowledge or skills learned in a particular subject. Accordingly, along with the growth of eLearning, online tests evolved rapidly as well (Stowell & Bennett, 2010). Largely, however,

online course examinations are used to evaluate the student's knowledge using computer technology without causing undue effects on the traditional university course examination— that is, tests taken with pens, papers, and invigilators while the traditional examination system using pen and paper requires more effort on the part of students and invigilators, a growing concern of educational institutions is improving the standards of online tests. Considering the increasing use of online examinations, the development of network technology policies has opened avenues on the conduct of online tests. Doubtless, university students can benefit from these services. Of late, experts have noted the need for a more efficient and convenient system of conducting online examinations by directing attention to all the elements of online examination, including the online test environment. Largely, efforts to streamline online examinations focused either on ensuring the credibility of test results by improving security and user authentication techniques, or by trying to improve the online test display and design features for a more efficient, convenient, and usable interface. However, a majority of prior literature on eLearning examinations focuses largely on security concerns, and has proposed the best user authentication systems to prevent online examination threats such as cheating and impersonation (Abdel Karim and Shukur, 2015). On the other hand, according to our knowledge, hardly any

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research focuses on the online examination design features. Hence, this study proposes to identify the specific design features of online examinations, which will facilitate the efficient and convenient process of taking online tests. Accordingly, a literature review was conducted to determine the potential elements or design features that make up online examination interface design and the possible values that could be used with those features. In addition, an experiment was conducted to identify the most common values selected by students for each design feature.

This paper is presented as follows: Section 2 is an overview of interface design and user characteristics; Section 3 presents the methodology; Section 4 shows the results; Section 5 discusses the results, and Section 6 summarises the paper and proposes future research directions.

2. User interface and user characteristics

Recent developments in information and computer technology and the use of the Internet worldwide underscore the importance of user interfaces (Calvary et al., 2003; McDaniel, 1994). New technologies are emerging for the comfort and convenience of the user and thus, user interfaces are becoming the key discriminator for many products (Park and Hwan Lim, 1999). Interface design is a part of the field of study called Human-computer interaction (HCI) where Human-computer interaction is the study of how humans interact with computer systems (Galitz, 2007; Stone, 2005). Hence, user interface refers to the part of a computer and its software that people can see, hear, touch, talk to, or otherwise understand or direct. In recent years, technology and tools have given us the motivation to create really effective and usable interface (Galitz, 2007). McDaniel (1994) defines user interface as follows:

“Hardware, software (including menus, screen design, keyboard commands, and command language), or both that allow a user to interact with and perform operations on a system, program, or device (p. 724).”

The user interface is an essential part of any software application, one that often determines how well end-users accept, learn, and efficiently work with entire systems (Hasan & Ahmed, 2007; Puerta, 1998). Whatever the underlying technology is, users can contact the system through the user interface (Agah & Tanie, 2000; Chalmers, 2003; Stone, 2005). For instance, a student taking an

online exam deals with the interface that is made up of many elements that are used in the question display and should help the student to perform the examination comfortably and efficiently.

User characteristics have a direct effect on many types of interface designs (Figueroa, Juárez-Ramírez, Inzunza, & Valenzuela, 2014; Rau, Choong, & Salvendy, 2004; Zhang, 2004). Michael and Mills stated that there is a relationship between a user's characteristics and his/her choice of font type (Bernard, Liao, & Mills, 2001). Meanwhile, Karsvall concluded that personality factors influence a user's interface design preferences (Karsvall, 2002). Besides that, Evers et al. indicated that design preferences do affect interface acceptance (Evers & Day, 1997). Therefore, online exam interface design must take into account the characteristics of a user. According to the literature (Arning & Ziefle, 2007; Figueroa et al., 2014; Stone & Jarrett, 2006; Zhang, 2004; Zudilova-Seinstra, 2007), the user characteristics that could have impact on the user interface design can be classified into: Physical, Psychomotor, Cognitive, Psychological, Demographic and Experience, as shown with an example of each in Fig. 1.

3. Method

In this study two stages were conducted: a literature review to identify online examination design features, and subsequently an experiment to specify the most common values that could be used in online examinations.

3.1. Literature review

This study posed the following research questions:

Question 1: *What are the possible design features that may affect online examination interface design?*

Question 2: *What are the appropriate values for each feature of online examination design?*

A review was performed on several scientific digital libraries and databases in English and it focused on articles identified with online exam design features and its possible values. All other insignificant articles were excluded. Several scientific digital libraries and databases were searched such as Scopus, Springer link, IEEEExplore, Science Direct, ACM, and Google Scholar. Table 1 displays the search keywords used in the above-mentioned digital libraries.

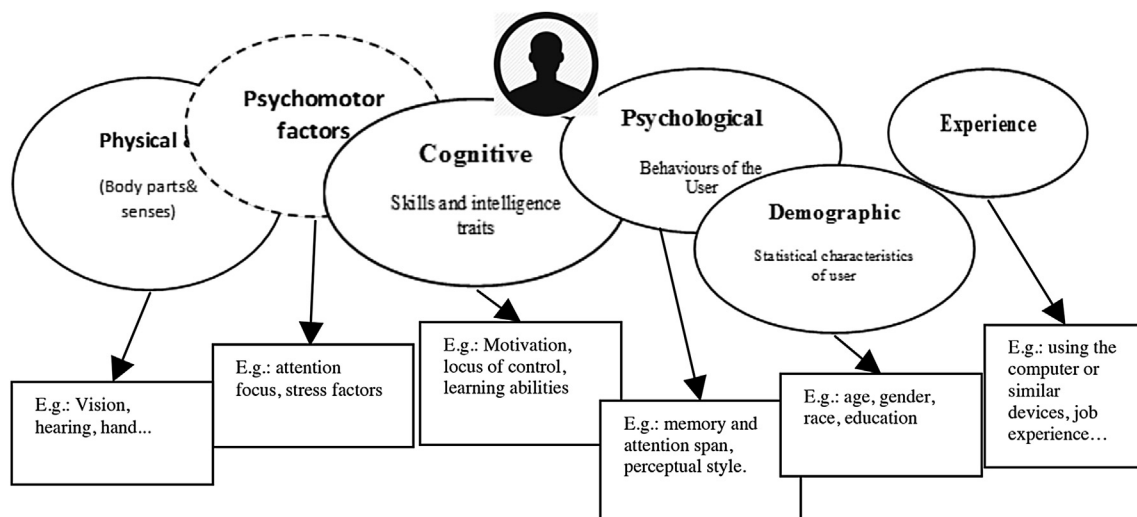


Fig. 1. User characteristics that may affect the interface design (Figueroa et al., 2014) (Zhang, 2004) (Zudilova-Seinstra, 2007).

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