Effect of User Sessions on the Heuristic Usability Method

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ABSTRACT

Heuristic evaluation (HE) is a widely used method for assessing software systems. Several studies have sought to improve the effectiveness of HE by developing its heuristics and procedures. However, few studies have involved the end-user, and to the best of the authors’ knowledge, no HE studies involving end-users with non-expert evaluators have been reported. Therefore, the aim of this study is to investigate the impact of end-users on the results obtained by a non-expert evaluator within the HE process, and through that, to explore the number of usability problems and their severity. This article proposes introducing two sessions within the HE process: a user exploration session (UES-HE) and a user review session (URS-HE). The outcomes are compared with two solid benchmarks in the usability-engineering field: the traditional HE and the usability testing (UT) methods. The findings show that the end-user has a significant impact on non-expert evaluator results in both sessions. In the UES-HE method, the results outperformed all usability evaluation methods (UEMs) regarding the usability problems identified, and it tended to identify more major, minor, and cosmetic problems than other methods.

KEYWORDS

Heuristic Evaluation, Inspection Usability, Non-Expert Evaluator, Usability, Usability Testing, User Session

1. INTRODUCTION

A revelation in technologies has led to a significant spread in system products and has thus increased the demand for system product development. One of the most popular types of system products is web-based systems (Sova and Nielsen, 2003), which play a significant role in enabling private or public organizations to provide information and services to end-users (Harrison and Petrie, 2007) (Alqurni and Pooley, 2016). An end-user is anyone who can use the target system and interact with its interface (ISO 9241-11, 1998), (Alqurni and Pooley, 2016). The user interface of web-based systems is the mediator of the interaction between the end-user and the website. The usability of the user interface has thus increasingly attracted interest in our world because of the growing increase in the number of users every year. Quantitatively, the number of users of web-based systems has dramatically grown from 1,971 million users (28.8% of the world population) in 2010 to 3,675 million (50.1% of the world population) in 2016 (Group, 2016).

DOI: 10.4018/IJOSSP.2018010104

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Chen (2012) stated that the success or failure of a product is significantly affected by its usability. Nielsen (2001) also reported that the reason behind the abandonment of 50% of sales websites is poor website usability. Commercial sites have also been shown to experience difficulties in the competitive environment due to poor usability (Osterbauer, Kphle, Grechenig, & Tscheligi, 2000). For example, nearly 39% of online buyers were found to have failed to accomplish their purchases online due to usage difficulties (S. Y. Chen & Macredie, 2005). This shows that good or poor usability plays a pivotal role in the success or failure of website products. Consequently, usability is considered one of the most important factors that influence the user interface of a web-based system, and it plays a significant role in fulfilling users’ satisfaction. Therefore, several usability evaluation methods (UEMs) have been developed to measure the level of usability. The most common UEMs used in web-based systems are the usability testing (UT) and heuristic evaluation (HE) methods (Fernandez, Insfran, & Abrahão, 2011). Although the HE method is described as being more affordable than the UT method, its results are prone to the opinion of the evaluators. UT results are derived from the end-user and are thus the consequence of real problems and it is limited to user tasks.

Several studies have attempted to improve the effectiveness of the HE method by examining the major factors of HE such as lists of heuristics or evaluator expertise. Expertise is one of the most important factors contributing to the improvement of the HE (Hwang & Salvendy, 2007) method, which can be used by either expert or non-expert evaluators. Nielsen (1992) has described the non-expert evaluator as one who lacks experience both in usability and in the system domain but who have a solid background in computer field. In contrast, expert evaluators are described as those who have expertise in usability. Although the former yield more accurate results (Nielsen, 1992), several studies indicated that expert evaluators are difficult to find (Äijö & Mantere, 2001; Desurvire & Thomas, 1993; Nielsen, 1999; Paz, Paz, Villanueva, & Pow-Sang, 2015). In addition, Fernandez et al. (2011) stated that: “Although inspection methods are intended to be performed by expert evaluators, most of them were applied by novice evaluators such as Web designers or students.”

Regarding the role of the end-user in the process of the HE method, most studies on the HE method depend on Nielsen’s (1993) argument that HE is not performed by end-users but by expert or non-expert evaluators. Fernandez et al. (2011) stated that one of the main disadvantages of HE is that it does not involve the end-user. In contrast to Nielsen’s view, Muller, Matheson, Page, and Gallup (1998) developed an HE method by involving users as “web-domain experts” as part of the evaluation team, and the technique then becomes that of Participatory Heuristic Evaluation (PHE), by combining experts with users. The authors claimed that if users are easy to recruit, then PHE can be as cost-effective as traditional HE. However, users in this method are described as “web-domain experts,” which differ from real end-users. In addition, this approach still requires expert evaluators on the PHE team.

Thus, continued research is necessary to study and address the usability topic, with emphasis on the exploration of the key factors of the HE method. Few studies have investigated the role of end-users in a HE method such as that used by Muller et al. (1998). In fact, the absence of the user’s point of view has been described by many researchers as one of the shortcomings of the HE method, (Holzinger, 2005; Oracle, 2012; Zaharias & Koutsabasis, 2012). Despite the effectiveness of the HE method of using evaluators as simulated users, Fu, Salvendy, and Turley (2002) stated that the evaluator does not represent the real user of the system. Therefore, the evaluator may fail to simulate the real user of the system in two ways: by failing to detect potential problems, or by identify usability problem which are ultimately not considered a real problem for the user. (Matera et al., 2006). It is clear that there is insufficient research into the involvement of users with the evaluators within HE method that enables exploration of both points of view. Hollingsed and Novick (2007) support this conclusion by stating, “It remains an open issue as to why usability professionals, in practice, rely on single-perspective methods, typically involving users, or experts, but not both.” To date, to the best of our knowledge, there have been no studies with a focus on the influence of end-users on non-expert evaluator output within the HE method. Thus, the main aim of this research is to investigate
Software Defect Prediction Using Genetic Programming and Neural Networks

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