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How Different Versions of Layout and Complexity of Web Forms Affect Users After They Start It? A Pilot Experience

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Abstract. This paper presents a research work that analyzes the effect of redirecting users between two different versions of a web form after they have started the questionnaire. In this case, we used a web form proposed by the Spanish Observatory for Employability and Employment (OEEU) that is designed to gather information from Spanish graduates. These two versions are different as follows: one of them is very simple and the other one includes several changes that appeared in the literature related to users' trust, usability/ user experience and layout design. To test the effect of redirecting users between both versions of the web form, we used a group of users that already have started the questionnaire and redirect them to the other version; this is, we changed the web form version they use to the other version and measure how this change affects them. This experiment has shown some promising results, which lead to enhance and extend the experience to bigger populations and other kind of changes in the user interfaces.

Keywords: Human-computer interaction \cdot HCI \cdot Web forms Online questionnaire \cdot User experience \cdot Performance

1 Introduction

Currently, the web forms are one of the most used ways to get information from the users [1]. The easiness of deploying web forms in websites and the users' habit to use them have converted online questionnaires in a pervasive tool to gather information. Thus, the research on engaging users to fulfil questionnaires and web forms is a

research area that evolves continuously and relates to other areas like user experience [2], psychology [3], data retrieval [4, 5], etc.

Regarding the user experience (UX), the work done to improve web forms in recent years has been carried to advance in issues like how to properly design the web layout [6, 7], how to design interesting user experiences [8–10], on how to communicate effectively with the user to improve the trust on the web form [3, 11], formalize usability standards [9, 12, 13], etc.

Following some of these research lines, we are working on how to propose and design different versions of the same web form to measure and detect which versions are the best regarding to improve the users' performance [14, 15]. From a methodological perspective, our approach is based on A/B tests. Following the A/B tests foundations, we show different variations of a website (in this case of a web form) randomly to different users and measuring what variation is the most effective (in terms of click-performance, task-performance, etc.). In our current research, we have developed two main versions: one based on extreme simplicity (with no visual effects or transitions, a simple layout, etc.) and other less simple that include characteristics like transitions, elements that enhance the user's trust on the website, a more elaborated layout, etc. In the following section (methodology) both versions will be explained in depth.

The different versions have been developed for a web form used by the Spanish Observatory for Employability and Employment (OEEU in its Spanish acronym) [16]. The web form is intended to gather data about how graduates get employment after they left the university. In this case, this online questionnaire is the most important tool for the Observatory to obtain data and information, without it the Observatory would not have data to develop their studies about employability and employment.

In the case of this research, we have applied the two different versions randomly to the graduates that participate in the OEEU's data gathering questionnaire. After a while, we began a reinforcement phase where the graduates that dropped out the questionnaire (or did not start it) would be given an opportunity to participate again. In this reinforcement phase, we redirected users between both versions (swapping users between the simpler and the less simple) depending on their performance, to test how varying the web form's features and complexity would affect the users' performance in completing the questionnaire.

So, this paper presents the results of a pilot study carried by the Spanish Observatory for Employability and Employment and the GRIAL Research Group at the University of Salamanca (Spain), with the objective of examining the effects of changing the web form layout and features on the finalization rate of the users that have already initiated the answering process.

The article is organized in three sections. The first one is dedicated to describing the methodology. It details the description of the different versions of the questionnaire, and the redirection process, as well as the research design, and the sample. After that, we present the results obtained, including the hypothesis testing using three-dimensional contingency tables. Finally, we will close the communication with a discussion and a brief series of conclusions.

2 Methodology

This section presents the methodology and other relevant aspects of this research.

2.1 Different Versions of the Web Form

The two versions of the web form, as explained before, are differentiated basically because the first version is the simplest one (in the case of a web form) and the other is a bit more complex and has several features designed to engage user and develop an effective communication and relationship. The different changes proposed between both versions are based on different proposals retrieved from the literature and design guidelines, as explained in [14].

In the case of the simplest version, which we call "A" version, the web form is a basic form built using Bootstrap 3, with only one logotype (from OEEU), and a simple combination of visual elements with basic colors like white, blue and green (following the Bootstrap's style). A basic example of how is the layout of this "A" version can be found in this PDF (content in Spanish) or in [14].

In the case of the "B" version (the second one), it changes several things aimed at developing a closer relationship with the user (as proposed in the Social Exchange Theory [1]), enhancing the user's trust on the web form owner and its intentions [3, 11], improving issues related to user experience [17], usability [18] and interface design of the questionnaire [7, 19]. Specifically, the changes introduced in the "B" version of the web form were:

- 1. Adequacy of the image to the other digital products of the Observatory. In this change, related to enhance the users' trust, we planned to update the visual layout of the web form to meet the OEEU's design guidelines used in other of their digital products.
- 2. Inclusion of the Observatory's logo and university's logo. In this case, this is a change also related to building trust. It proposes to include the OEEU's logo in the web form header, as well as the logotype from the university where the student graduate.
- 3. **Inclusion of a progress bar in the questionnaire.** In this case, the proposed change was focused on improving the user experience with the web form. It is a simple change that consists (only) in including a progress bar that informs users about their progress in the task of finalizing the questionnaire.
- 4. **Present a visual focus animation on concrete actions.** Another proposal related to the usability and user experience. In this case, this change was designed to get the user attention and minimize the effort on using the web form. In this case, for example, the web form will auto scroll smoothly to the following question after the user responds to the previous one.
- 5. **Deactivation of control elements when an action is initiated.** This proposal consists on deactivating visual elements (like buttons) while they respond or complete an action requested by the user. For example, deactivating a button after the user clicks on it while the action triggered is completed.

6. In related elements, instead of having smaller and more specific groupings, use some larger grouping, following the Gestalt principles on grouping. This change was specially designed for large groups of questions/answers. Usually, in the web form, questions that include subquestions and nested response options are arranged in tables. For example, following the proposal, the header of a table would be fixed while the content can be scrolled up and down. It seeks to ensure that the large dimensions of analysis in some points of the questionnaire are grouped to avoid user fatigue and reducing the users' cognitive load when dealing with large tables or complex visual elements.

To get more information or find visual examples of these changes, we refer the reader to [14].

2.2 Redirection Process

As previously commented, the users were initially assigned randomly to use the "A" or "B" version of the web form. While users were using the web form, we analyzed what kind of factors (users' personal factors, technological aspects, etc.) were related to the users' performance in completing the questionnaire. By using predictive models and clustering techniques, we figured out the behaviors shared among users, what were their common characteristics, etc., to find patterns that define what lead users to achieve better performance metrics. As an example, in this previous research to know the most relevant user factors regarding to performance, in general we found that users have better average performance using the simplest version ("A"), except for those users that employ mobile or other devices with special specs like big screens or screens with an extremely good resolution, etc. Specifically, we found that users that meet the following criteria had better performance metrics in the "B" version:

- 1. Users that utilize Android devices with screens of 3- or 4-pixel ratio.
- 2. Users that accessed to the web form using large iPhone devices (iPhone 6 Plus, 6 s Plus, or 7 Plus).
- 3. Users that use Android tablets.

So, in general, in the reinforcement phase, all users that randomly were assigned to use the "B" version and did not meet these conditions were redirected to the "A" version. On the other hand, all users that used the "A" version in the initial stage and meet those conditions (or rules) were redirected to the "B" version in the reinforcement phase. This kind of rules were used to change users between both versions.

2.3 Research Design and Sample

The study presented in this paper is framed within another big (and more generalist) study about web forms and user experience. The whole experiment was conducted with more than 6700 users (graduates). Specifically, the questionnaires about employment were initiated by 6738 users, from which 5214 finalized the process (finalization ratio of 77.38%).

As previously commented, we ran a reinforcement phase after the first round of questionnaires; in this reinforcement stage were invited again to participate all those students that did not completed (or started) the web forms at the first round.

In the case of the study, 123 users were involved that participated in the first round and did not finalized the questionnaire, reentering again on the questionnaire during the reinforcement phase.

Analyzing these users, we studied the users' performance related to each version of the web form and we swapped users between both versions to test what is the effect of this change in their performance.

To do so, we proposed a quasi-experimental research design with a control group. Following this design, we divided the users in two groups: the experimental group (89), composed by the users that were redirected from one questionnaire design to a different one, and the control group (34) composed by those users that remained in the same questionnaire design.

After the application of the different treatment to each one of the groups we compared the differences in the finalization rate using three-dimensional-contingency tables and chi-squared to analyze the impact of increasing or decreasing the complexity of the questionnaire. In consequence, we pose the following hypotheses:

- **H1** The redirection to a different version of a questionnaire will have an impact on the finalization rate.
- **H2** The redirection of users from a text plain questionnaire to one with more complex elements will have an impact on the finalization rate.
- **H3** The redirection of users from a questionnaire with complex elements to a plain text one will have an impact on the finalization rate.

3 Results

As mentioned before, to assess the general effect of the redirection of the users on the improvement of the finalization rate we have used an approach based on the use of three-dimensional-contingency tables, a methodology of analysis useful to compare the effect of a variable in the relationship of the other two variables.

In this case, we will begin analyzing the effect of the web form version in the users' finalization rate to decide which the users will be redirected following our rules in the redirection phase. In other words, we analyze the effect of the redirection considering the version of the questionnaire to decide which users will be redirected during the reinforcement phase.

As a first step for the analysis, we elaborated the three-dimensional contingency table for this variable to see if there are observable differences at plain sight between the control and the experimental group considering the version of the questionnaire to which the users were redirected (Table 1).

As we can see in Table 1, there were some minor differences in the finalization rates of the control and the experimental groups in both versions of the questionnaire. In consequence, we proceed with the calculation of the chi-squared index to find out

Version redirected to	Group	Finalized	
		Yes	No
А	Control	10	4
	Experimental	38	33
	Total	48	37
В	Control	9	11
	Experimental	7	11
	Total	16	22

 Table 1. Three-dimensional contingency table for questionnaire redirection.

wether there were any relation between being redirected and the finalization of the questionnaire (Table 2). The results lead to the rejection of the hypothesis H1 (*the redirection to a different version of a questionnaire will have an impact on the final-*

Table 2. Results of chi-squared for questionnaire redirected to

Vertical redirected to	Value	df	Significance
А	1.526	1	0.217
В	0.145	1)	0.703
		~	

ization rate) in both versions for a significance level of 0.05.

Lastly, to contrast the last two hypotheses, we perform the same procedure, but considering the complexity change. This way, we measured if the users changed, from a simpler version of a questionnaire to a more complex one or if at the contrary, the users change from a complex questionnaire to a simpler one. As in the previous case, we begin elaborating the three-dimensional contingency table (Table 3), but only with the users that were redirected from questionnaire A to questionnaire B or from questionnaire A.

Version redirected from	Group	Finali	Finalized	
		Yes	No	
A to B	Control	10	4	
	Experimental	1	8	
	Total	11	12	
B to A	Control	9	11	
	Experimental	17	19	
	Total	26	30	

Table 3. Three-dimensional contingency table for questionnaire redirected from.

After analyzing the results, we performed the correlational analysis to know if there were any relation between being redirected and the finalization of the questionnaire. For the case of the change from questionnaire A to questionnaire B we used Fisher's exact test, due to the size of the groups (Table 4). The results support hypothesis H2 (the redirection of users from a text plain questionnaire to one with more complex elements will have an impact on the finalization rate), but reject hypothesis H3 (the redirection of users from a questionnaire with complex elements to a plain text one will have an impact on the finalization rate).

Vertical redirected to	Value	df	Significance
A to B	-	-	0.009
B to A	0.026	1	0.873

Table 4. Results of correlation for questionnaire redirected from.

4 Discussion

The results obtained in the present research entail a series of implications both for theory and practice of the design of online questionnaires.

Firstly, we would like to highlight the rejection of the hypothesis H1. This can be caused by the fact that the redirection rules were based on the behavior of the users that entered the questionnaire for the first time, which indicates the need to deepen in the analysis of the behavior of the people that resume the questionnaire completion process to know how this variable may impact the finalization rate of this kind users.

In this line, the results of the analysis of the hypotheses 2 and 3 suggests that increasing the number of design elements in the questionnaire has a negative effect on the finalization rate, while the redirection to a plain text questionnaire does not have any effect.

A possible explanation may lay in the users' motivation. The users participating in this pilot study are those that have already tried to complete the questionnaire but abandoned the process, which make very likely that their motivation levels were low. Taking this into account, it is logical to think that when these users resume the process, finding a questionnaire with more design elements that the one that they initiated in the first place, may feel discouraged.

As a consequence, we believe that avoiding this kind of redirections in the case of users that are resumed the questionnaire is advisable.

Another possible explanation could be related to some of the elements introduced or removed when changing the web form version. In this sense, the experiment in its current setup cannot allow us to ascertain which changes affect more or less to user performance. For that reason, one of the main shifts and improvements in this experiment and research could be to divide more the versions, achieving the same number of versions than the total changes. So, in this case, we would be able to detect how affects each individual change to the user's performance compared to the simplest version.

5 Conclusions

This paper presents a novel research work that analyzes the effect of redirecting users between two different versions of a web form after they have started the questionnaire. We used a web form proposed by the Spanish Observatory for Employability and Employment (OEEU) that is designed to gather information from Spanish graduates. To test the effect of redirecting users between both versions of the web form, we used a group of users that already have started the questionnaire and redirect them to the other version; this is, we changed the web form version they use to the other vertical and measure how this change affects them.

In general, the results are quite promising and encourage us to continue the labor of researching how different changes in web forms affect users' performance. In this case, we can conclude that if we redirect users between two versions of a web form, the change will be negative if the user is redirected to a more complex version and will not have effect if it is redirected to a simpler version. In the future, we would like to enhance and extend the experiment to bigger populations and other kind of changes in the user interfaces to verify these initial results. Also, we would like to test how users feel the change and what is their opinion about the change (to compare also their feelings and perception to their performance).

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