TITLE

Abstract

In this research paper, we have taken a closer look at web design with an accent on responsiveness and accessibility. We have aimed to discover how these two trends affect the overall user experience. Designing an experiment in 3 stages, we were able to find out in what way

Classification

ASM: 68M11 Computer science -> Internet topics

ACM: D.2.10 Design

Introduction

4. Related Works:

One study that is closely related to the first experiment we did is “The effect of

responsive web design on the user experience with laptop and smartphone devices”. In this

paper, the researchers asked participants to navigate on responsive and non-responsive sites

on both a computer and a phone and measured their satisfaction with that interaction.

According to the author “The results revealed that users had a better user experience with

Smartphones than with laptops while using the system, however, for most of the metrics

collected, users’ experiences with the two device types were not significantly different at 95%

level of confidence, implying that for those metrics, the responsive web design had a similar

effect on the users’ experiences and attitudes .” 7

The approach taken by this paper is more centered on the statistics of it all as they used a

wider range of metrics than we do in ours. On the other hand, because we decided to use pairs

of 6 sites in our research, we have increased the stimuli that participants interact with.

Therefore, the results in our paper show a bigger perspective and are not limited to the

subjective likes/dislikes of a certain site that participants may have. It then appears that users

prefer to interact with responsive web design on the phone, which seems to also be the case in

our experiment.

When it comes to accessibility, we have looked over “Impact of accessibility and

usability barriers on the emotions of blind users in responsive web design”, a paper which

aimed to combine both accessibility and responsiveness in an experiment with blind people.

The results of this study show that blind users had negative emotions when interacting with

responsive web sites in a much bigger proportion than when interacting with non-responsive

ones8. Although not directly related to our research, this piece of information is crucial

because it shows that when designing for responsiveness, web developers tend to forget to

include also elements of accessibility. The paper particularly mentioned the fact that most

responsive websites are not prepared to be read by the text-to-speech software that blind

people use. From this experiment and from our own results, we can conclude that a

combination of responsiveness and accessibility is the actual key to success. When

developing only for able-bodied people, programmers risk alienating a bit part of the general

population.

Another study of interest is “Time for a Response: Responsive Design, Accessibility,

and University Websites“ which tried to find a connection between the responsiveness and

accessibility of university sites and the tuition fee and overall satisfaction of the students

attending said university. The author analyzed 100 university websites and looked for certain

metrics, then compared the results with the information he gathered about the university’s

community.

According to the paper, “The study found no connection between responsive web

design and tuition costs, total enrollment, acceptance rate, or geographic area”9. However, it

did found a correlation between the accessibility and total enrolment in the facility.

Furthermore, the author mentions that bigger universities have already upgraded their sites to

responsiveness/accessibility standards and it appears that smaller ones will follow suit.

Although the approach and topic of this paper is not strongly similar to ours, we believe it is

of importance to note because it shows that higher standards are being raised for websites

worldwide. Since universities are places where change often starts, it is safe to say that

inclusivity in the online world is one of the future’s trends.

Our results do show that accessibility appears to be less import to able-bodied people.

Different from the paper mentioned before, we have decided to use people in our

experiments, therefore eliminating our personal bias. We believe although relevant, it is not

clear in what way the author can draw conclusions only based on the statistics he finds about

the university, as total enrolment can be influenced by many other factors.

Original Approach

Method / Case Study

1. Research Method:

In order to gain more information about the way web responsiveness and accessibility

influence the experience users have, we decided to test the hypotheses in 3 ways. We could

consider these as 3 separate experiments or as one experiment with 3 phases. The number is

justified because we are looking at responsiveness on its own, accessibility on its own, and at

both of them combined.

2.1 Experiment

Experiment 1 will focus on validating or invalidating H1. In this experiment, 2 groups of

people will be asked to interact with a set of 6 sites, both on a laptop and on a mobile phone.

Out of the 6 sites, 3 will be responsive and 3 will not. After interacting with these sites, the

participants will answer a survey (detailed below).

There will also be a control group, who will interact with all 6 sites. However, for the

responsive ones, we will use unresponsive copies of the sites, making all 6 of them

unresponsive. This way, we can accurately measure if the preference for the 3 responsive

sites grew because they are responsive, removing other possible subjective reasons such as

design, content, name, etc from the problem.

Experiment 2 will focus on validating or invalidating H2. In this experiment, the 2

experiment groups will interact with 3 accessible sites and 3 inaccessible ones, only on a

computer. After the experiment, the groups will answer a survey (detailed below).

The control group will interact with inaccessible copies of all 6 sites.

Finally, in experiment 3 we will test the importance of combining accessibility and

responsiveness. The participants will interact with 12 sites both on computers and on mobile

devices.

There will be 3 accessible sites, 3 responsive ones, 3 inaccessible and unresponsive ones, and

3 both accessible and responsive ones.

The control group will interact with copies of all 12 sites.

2.2. Participants

The groups in these experiments will be chosen using a convenient sampling method

(esantionare de convenienta). The participants will not be rewarded or paid in any way,

making participation in the experiments completely voluntary. Participants will be able to

withdraw at any moment. If a participant does not fully complete the survey, then she/he is

considered withdrawn from the experiment and the already given answers are not taken into

account.

Given the fact that we use convenience sampling, we can expect that there will be little to no

demographic difference in our groups, meaning that the results we will obtain can not be

generalized to a larger population.

In order to promote a more inclusive worldwide web, in this experiment, we will include a

group of disabled people.

Group1: Able-bodied people (convenience sampling)

Group2: Disabled people suffering from one of the following issues: eyesight issues

(including color blindness), blindness, learning disabilities (such as dyslexia), mobility issues

that prevent the usage of a mouse/touchpad, seizures, ADHD.

Group3: Random people chosen by convenience sampling.

2.3 Sites

To ensure objective responses, we have tried to pick sites from a wide range of

domains, as to not have them compete again each other from a content point of view. If we

were to have two sites about gardening, we might subconsciously make the participant

choose which of these had better information, structure, etc, therefore making the participant

pay attention to something else altogether. In any case, our research cannot avoid a dose of

subjectivity, as it is impossible to take design, colors, and personal preferences out of the

equation.

When choosing the sites, we consulted various online sources, such as lists of best

accessible sites or examples of best responsive web design practices. Even then, we had in

mind a few characteristics:

a) Responsive sites were tested on 2 types of smartphones, with different size screens

and from different manufacturers, and on a tablet. We wanted to ensure readability

and ease of use.

b) Accessible sites had to be readable using a text-to-speech app, the contrast between

colors had to be powerful and the titles, subtitles, and text had to be easy to see and

read.

The list of sites can be consulted in Annex1.

2.4 Surveys

As mentioned before, the participants would complete surveys as soon as they are

done interacting with the sites. In creating these surveys, we tried to keep them short and as

much to the point as possible, and we looked for several pieces of information: which site did

they like the most and why, which site was the easiest to use, ratings of all sites, knowledge

of responsiveness/accessibility and demographic information. The complete surveys can be

found in Annex2.

3. Case Study

In order to gather, aggregate, and analyze the responses to our three surveys, we have

implemented an application. This application is supposed to aid in the collection of the

information as well as in the process of drawing conclusions from the data. In the future, it

will also be able to export the information in an excel sheet.

3.1. Method

Upon agreeing to participate in the experiment, the participant is given a number

(from 1 to 3) which represents the survey he/she will take part in and a second number (from

4 to 6) representing the group (4 - control, 5 - experiment group, 6- experiment group

disabled).

After interacting with the sites given by the researcher, the participant will log into the

app using these two numbers and will be presented with the questions from the respective

survey and will afterward log out.

At any point, the researcher will be able to log in and ask for an analysis of the data so far

gathered and will be prompted first with a list of statistics (how many of group x responded

y) and then with some conclusions gathered from the data.

The code is written to be able to draw simple conclusions that support or contradict

our hypotheses. (e.g. if the site most liked by the experiment groups is responsive, but the site

most liked by the control group is not => responsive sites are preferred. The opposite result

would show that responsive sites are disliked. If the most liked site of the experiment group is

responsive and so is the one from the control group or both of them are not responsive, then

no conclusion can be drawn and the hypothesis is neither confirmed nor contradicted)

Using such an application ensures that the likelihood of human error is extremely slim, as no

person comes in between the answers and the conclusions.

Results

3.2. Initial Results

After gathering responses from the 450 participants (50 for each group, for each phase

of the experiment) using the aforementioned application, we have reached the following:

Experiment 1

● 64% of the control group preferred to use a mobile device over a computer, while

87% of the participants in the experimental groups preferred mobile devices. This

shows that having responsive sites can improve the overall experience with a certain

device. However, since this was not the purpose of our experiment, such a conclusion

cannot be clearly drawn or generalized.

● In the control group, the most liked site (~43%) was site 121 (not responsive), while in

both of the experimental groups (~32% and ~40%) it was site 52 (responsive).

● When asked what they liked about the site they rated most, over 60% of the

participants named reasons such as colors and overall design, in control and

experimental groups.

2 https://aneventapart.com/

1 https://www.aam.com/

● In more than 90% of the cases, the most liked site coincided with the site named as

“most easy to use”, both in the control and experimental groups.

● In the control group, 23 participants (~11%) said they know what responsive web

design means. In the experimental groups, the results were 31 (15.5%) and 20 (10%)

respectively.

● In the control group, only ~15% of respondents named one or more sites as being

responsive. In the experimental groups, this percentage grew up to 62% and 57%

respectively. Over 80% of the sites named in this question were, in fact, responsive (in

the experimental groups).

Experiment2

● In the control group, the most liked site was site 12, while in the first experimental

group it was site 113 and in the second experimental group it was site 24.

● In the control and first experimental group, the most liked site and the easiest to use

site were the same in less than half of time. In the second experimental group, this

percentage was over 80.

● In the control group, 43% of respondents said they know what an accessible site is. In

the first experimental group, 57% of the respondents knew. In the second

experimental group, 96% of the group knew.

● The control and first experimental group had trouble identifying the accessible sites.

The second experimental group identified correctly in more than 78% of times.

Experiment3

● The most liked site by the control group was site 11. The most liked site by the first

experimental group was site 45. The most liked site by the second experimental group

was site 76. Site 4 is designed as responsive and site 7 is both responsive and

accessible.

● In the control group, the most liked site was rarely (~23) the saame as the easiest one

to use. In the experimental groups, this corelation was frequent (~68% and 83%).

● In the control group, only 38% of participants could tell what responsive web design

means, and ~42% could say what accessible web design means.

6 https://www.fivesimplesteps.com/

5 https://aneventapart.com/

4 https://www.lonelyplanet.com/

3 https://www.budgetsaresexy.com/

● In the first experimental group, 49% knew about responsiveness and 62% about

accessibility.

● In the second experimental group, 41% knew about responsive web design and 94%

knew about accessibility.

Demographics

● Out of the 450 respondents, 328 are employed, with 196 of them in the IT sector.

● When it comes to gender, the participants were mostly men (59%). This is most

certainly due to the fact that participants were chosen by convenience, in general from

universities where there are significantly more men than women.

● 412 (~91%) participants were from Romania, while the rest of them were from inside

the EU.

● All of the participants have completed high school and most of them are currently

attending undergraduate studies.

Conclusions

Following the above-mentioned data, we were able to draw a few conclusions related

to the nature of our hypotheses.

H1: Users prefer responsive sites over unresponsive ones when using both a computer and a

mobile device

Judging by the results of the first experiment, responsiveness does seem to affect the

way a user perceives the interaction with a site when using both a computer and a mobile

device. Preference for mobile devices was significantly larger in the groups that also

interacted with responsive websites. Moreover, the most liked site was a responsive one in

the experimental groups and did not coincide with the one chosen by the control group.

Moreover, since over 90% of the participants named the best site as the site most easy to use,

it is clear that ease of use influences drastically the way a user perceives a site.

Therefore, H1 is confirmed.

H2: Users prefer accessible sites over inaccessible ones when browsing both kinds

In the case of this hypothesis, things are more difficult. The results show that the

disabled group significantly preferred to browse an accessible site over an accessible one.

However, the abled-bodied group showed no preference in this regard. This is probably due

to the fact that most people give little to no importance to the accessibility part of a site

because it does not affect their interaction with said site.

Even so, taking into account that the majority of the disabled group preferred these

types of sites, we can affirm that it is important for web developers to go the extra mile and

include accessibility on their agenda.

H2 is only partly confirmed - Disabled users prefer accessible sites over inaccessible

ones

H3: Able-bodied users are more likely to notice and prefer responsive sites, while disabled

users will prefer accessibility over responsiveness.

Although it appears that disabled users did notice accessibility more than they did

responsiveness, and showed a great interest in the former, this hypothesis can neither be

confirmed nor denied as it turned out to be outside of the scope of our research. More data is

needed to be able to draw an accurate image, including having the same group of participants

interact with accessible and responsive sites. Although we did do that in experiment3, the

information gathered is not conclusive in any way.

H4: Sites having a combination of responsiveness and accessibility will be preferred by

users.

This hypothesis is confirmed, as the sites ranked top by the majority of the

experimental groups were sites that included both accessibility and responsiveness. This can

be due to the fact the accessible sites tend to have more contrast between the colors and are

easier to use, even for abled-bodies people.

Bibliography