

Improvements to the user experience of a 3D Editor Software through a Web-based approach

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Abstract- This research paper develops a 3D Editor Software using a HTML5 based browser. Its main aim is to list and identify the major advantages of a cross-platform approach from the user experience and human-computer interaction point of view, in order to incentivize the usage of the Computer Graphics from a different range set of users.

Index Terms- Computer Graphics, Human-Computer Interaction, Mobile HCI, Software, User Experience, WebGL.

I. INTRODUCTION

Mobile and portable electronic devices have become extensively used among the last decade, involving Human-computer interaction to enlarge its research scope with a disruptive new research field: Mobile Human-Computer Interaction. This field takes into consideration internal interface factors, such as usability or legibility, and external device factors, like the environmental conditions or device capabilities, when evaluating an app for further usage from the potential target users.

In this particular case, a 3D Web-Based Editor Software is first developed and later evaluated in two different work environments. This WebApp is evaluated in a workstation and in a portable-device scenario in order to define the improvements to be made for a successfully accomplishment of a better mobile user experience on 3D Editors tools.

II. RESEARCH ELABORATIONS

In order to be able to compare, edit and modify a Web-based 3D Editor Software in accordance with the User Experience findings of this project, a Web-based 3D Editor has been developed using ThreeJS and WebGL technologies.

The objective of this Software tool is aimed to let the final-end user create and interact with a 3D object through a HTML5 based browser. The user will be able to upload, edit and download the models in different files formats and extensions. In addition, the user will have the capability to add multiple objects in the scene, compose and modify them and lately export the scene into ThreeJS native format. This file format extension will be the largely used by the industry JSON (*JavaScript Object Notation*) file extension.

This software has been designed for screen displays higher than HD resolution (1280px x 720px) in workstation environments and adapted for iPad resolution (1024px x 768px) in portable devices environments. In addition, manual and automatic testing have been used in order to collect quantitative data and feedback in both scenarios. Collected data will be empirically compared in both scenarios, taking into consideration internal and external factors of the WebApp.

III. RESULTS AND FINDINGS

In order to analyse and list the main differences related to the 3D Editor WebApp between a workstation and a portable-device scenario from the user experience point of view, 15 different people ranging from 15 to 80 years old have tested the WebApp in both scenarios. Five people of this group had previously experienced 3D Editor Software such as Autodesk Maya, Autodesk 3D Studio Max or Cinema 4D. Other five people had previous experience with computers and portable devices, such as laptops, tablets or smartphones, but had no experience with 3D Editor tools. The remaining five people had very basic knowledge of technology, mostly limited at a basic operational level.

In addition, the workstation scenario has been performed in a stressful studio environment with a last-generation computer as a Human-Computer interaction tool. In the opposite side, the portable device scenario has been performed in a sofa at a home living

room using an iPad 2, in a more relaxed and calmed environment. These external factors tried to accurate as much as possible the differences between the average usage of a workstation against a portable device. According to the external factors, results are subject to slightly vary and change depending of external situations.

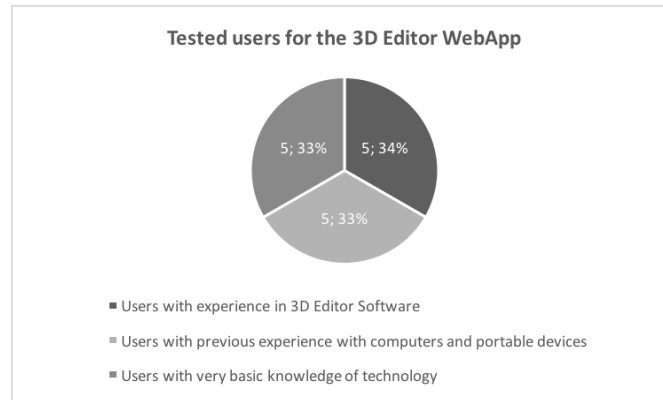


Figure 1. Graph with the tested users profile for the 3D Editor WebApp.

As it can be seen above, in the graph displayed in figure number 1, the amount of participants whose knowledge is related to Computer Graphics was only one third of the overall tested users. This knowledge gap became extremely clear when they were asked to interact with the current 3D Software tools, as people without related knowledge were completely lost in the user interface of the software, due mainly to its large amount of menus. This result was equally equivalent to the one obtained with the workstation version of the WebApp, having the only difference based in the fact that the user interface was simpler. Therefore, tested users were able to understand the options of the WebApp quicker.

However, when unexperienced users were asked to interact with the portable-device version of the app, the need for explanation was dramatically decreased. The interaction with the fingertips came totally naturally from them, knowing how to move, rotate and translate the objects of the scene without any previous explanation. This achievement caused a self-satisfaction feeling from them, resulting an exponentially increased time of the interaction from the user. As it can be seen below, in the figure number 2, the average time spent by the user in the portable devices is four time higher than the time spent in front of a computer screen.

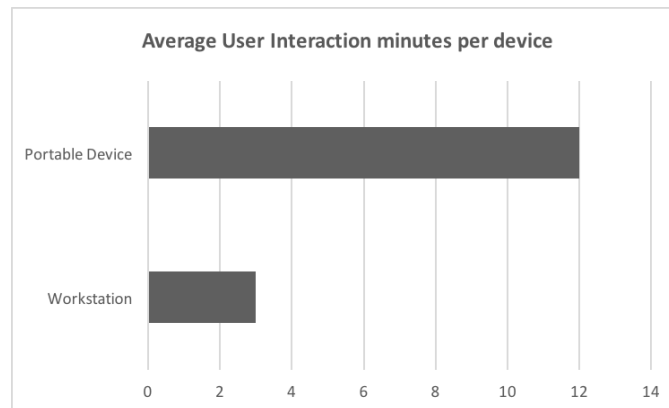


Figure 2. Graph showing the average User Interaction in minutes.

In addition, all the tested users reported extremely high levels of engagement with the portable device version of the app. They were truly self-satisfied with the fact that they achieved results without strictly guidance. Furthermore, the fact that everything was built from scratch using their hands was exceptionally rewarding for them, specially the ones with basic knowledge of technology.

The usage of a keyboard and a mouse to interact with the desktop version of the app was majority seen by unexperienced users as a barrier rather than a tool itself. An extensive set of options and possibilities is opened when a keyboard is used as the Human-Computer interaction tool. Therefore, unexperienced users found that too many information was needed in order to complete a simple operation and easily gave up.

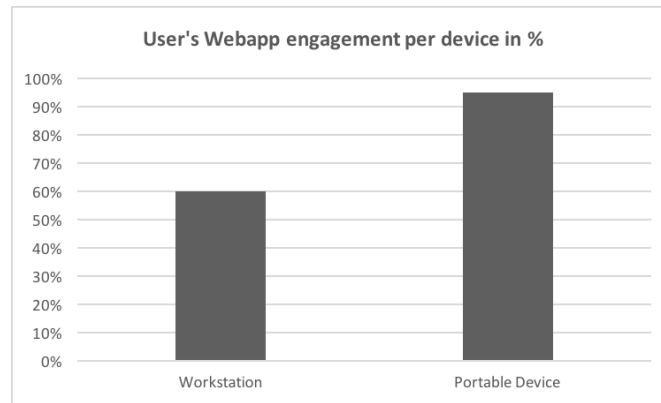


Figure 3. Graph showing the average User's engagement per device.

In contradistinction, experienced users were more engaged with the desktop version of the app due to the fact that an extensive set of options and possibilities was eligible to be used. Therefore, this group of users spent more time playing around with the WebApp features in the desktop version than with the portable device version of it.

IV. CONCLUSION

Taking the experiments results into consideration, it is perfectly clear that the user engages in completely different ways depending on the amount of technology knowledge he or she has. As a result, in order to satisfy the needs of the users, several approaches need to be made. A user with an expert knowledge will require a more complex scenario, normally based in a workstation with the required equipment. Whereas inexperienced users, will more likely engage with an easier and simpler version of the app due to the fact that it is more intuitive for them, as can be seen in the statistics showed above.

In addition, the large average amount of interaction time for first-time users concludes that they are willing to interact for a long time with the app as long as a simple and basic interface is presented to them. As a result, we can conclude that current desktop-based software could be extended to portable-devices in a simpler and easier way. This extension will help expert users to edit or modify some sporadic settings when they are on the go, and more important, introduce new users to the Computer Graphics basics.

In conclusion, considerably new technologies as WebGL could be used in conjunction with portable devices in order to broaden the scope of users that can interact with Computer Graphics in an every-day basis. Current software companies could extend their available programs into a simpler version of their application tools for portable devices in order to captivate new potential users and extend their support for current and experienced clients.

APPENDIX

Web-based 3D Editor Software developed with ThreeJS and WebGL technologies can be found at GitHub as an open source project.

The ItemGL plugin implements an application that simply lets the user customize an item using WebGL and ThreeJS. (2015, September 25). Retrieved from <https://github.com/llogaricasas/ItemGL>

ACKNOWLEDGMENT

I am using this opportunity to express my gratitude to everyone who supported me throughout my educational and professional activities. I am thankful for their aspiring guidance, invaluable constructive criticism and friendly advice during the project work. I am sincerely grateful to them for sharing their truthful and illuminating views on a number of issues related to all the projects completed during the whole year.

I am also grateful to Dr. Vasilis Argyriou, lecturer in the Department of Science, Engineering and Computing in Kingston University, London. I am extremely thankful and indebted to him for sharing expertise, and sincere and valuable guidance and encouragement extended to me. Last but not least, I also thank my parents and my sister for the unceasing encouragement, support and attention.

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