

Usability Defender: A Web Usability Game for Beginners

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Abstract

This paper describes an application, in the form of an educational video game, created for beginner web designers, online marketers, webmasters or any new web publisher with the goal of introducing the basic principles of web usability in a fun way. The game is based on the classic arcade game Galaga (1981) and all educational information originates from Dr. Jakob Nielsen's research on usability located at useit.com. The application is located in the online portal UsabilityDefender.com.

Keywords

web usability, educational video game, Jakob Nielsen

1. Introduction

In the last decade, social media and cloud computing solutions have exploded. This has provided the average user or employee the ability to author websites and webpages to help their company compete in the online space. As such, it is essential for not only large corporations but small to medium sized companies to understand web usability in order to harness the opportunity this opens up, and most importantly, to survive and thrive in the technology age.

In the area of web usability, 'good' or 'bad' is based on the quality of interaction a user has with your website. With intranets, web usability aids in employee productivity--the more user friendly the application the less time will be wasted trying to figure it out. This is especially true in the case of e-commerce. Usability is essential to help users find the product they are looking for as well as to provide a safe and secure online experience.

Best practice suggests ten percent of an applications budget be spent on usability. Doing so will reportedly double a websites quality metrics as well as slightly less than double an intranets quality metrics (Nielsen, *Usability 101*:

Introduction to Usability).

2. Background

The area of web usability research is dominated by Dr. Jakob Nielsen. Nielsen has been dubbed "the King of usability" by *Internet Magazine* and "the Guru of web page usability" by the *New York Times*. Although there are other web usability experts, Nielsen's work is often accepted as the standard. His past research topics have covered everything from eye-tracking on e-commerce sites to researching the velocity of Media Consumption in different mediums. To read Nielsen's biography visit: <http://useit.com/jakob>.

Nielsen defines usability as having five quality components:

1. **Learnability:** How easy is it for users to accomplish basic tasks the first time they encounter the design.
2. **Efficiency:** Once users have learned the design, how quickly can they perform the tasks.
3. **Memorability:** When users return to the

design after a period of not using it, how easily can they reestablish proficiency.

4. **Errors:** How many errors do users make, how severe are these errors, and how easily can they recover from the errors.

5. **Satisfaction:** How pleasant is it to use the design.

(Nielsen, *Usability 101: Introduction to Usability*).

Nielsen's serves an important role in Usability Defender; not only is he the main resource of educational content but also is the star in the video game. You will often see him appear to help guide the way, let you know when you are doing well or when you need to go do more studying on usability.

3. Goal

Taking the scientific knowledge of Dr. Nielsen and applying it to an interactive game, complete with a story line, Usability Defender's goal is to introduce web usability standards.

4. Usability Defender

4.1 The Concept

While many a blog posts or articles have simply regurgitated Nielsen's concepts and theories, Usability Defender adds another dimension--fun. While still at a primary stage, Usability Defender engages the user into a storyline aimed at providing an experience that will keep users coming back to learn more. A similar application has not been found online or any type of application that tries to introduce learning web standards in a fun and interactive way.

4.2 The Game

Usability Defender is designed in classic arcade style, specifically modelled after the 1981 hit Galaga, with a small touch of the 1980 game Centipede. The decision to include the centipede concept of an advancing attacker was chosen as homage to the video female programmers and players of the early eighties. Centipede was the first coin-operated game to have a significant female player base and was designed by Dona

Bailey, "one of the few female game programmers in the industry at this time" [Wikipedia, "Centipede (the game)"]. This decade of video games was chosen to provide a sense of nostalgia to would-be webmasters of today.

When game play starts you are the fighter ship positioned at the bottom of the screen. Your goal is to simply shoot all enemy aliens which are advancing towards you.

Enemy aliens can be identified by an image representing a bad usability practice. The trick is some alien ships are actually your allies and their image represents a positive type of usability practice which improves user experience online. When you shoot the enemy aliens you get points; when you shoot the allied aliens, points are taken away.

To win the game you need to not only destroy all alien ships but also earn a certain number of points. The number of points needed to win varies depending on the difficulty level you selected at game startup. The difficulty selected also changes the speed at which the aliens advance. If you get enough points and destroy all enemy alien ships Dr. Nielsen will be there to congratulate you.

4.3 The Code

Usability Defender is built in Processing with Java. The application was built using three classes: The Usability Defender Ship (Ship), The Alien Targets (Target), and the missiles the usability ship shoots (Missile).

The class Ship has three properties: x-position, y-position and the image for the ship. Since the image is constant this url is hard-coded in the class. As the ship only moves linearly across the screen, the class ship only contains parameters limiting the x-position and keeping it within the screen. The default x and y positions are defined in the setup method for the object "new Ship" to be at the middle and bottom of the screen.

The class target represents the alien ships. It has six properties: x-position, y-position, image, url string, the state (represents if the ship is allied or

an enemy) and visible (represents if a missile has already hit the ship or not). Similar to the ship's class, the target class has limitations set on the x-position. But in this case the limitations make the ship appear on the opposite side of the screen when it reaches the x-max or x-min location depending on the way the ship is moving.

2-dimensional array lists are created for each alien ship representing their x-position and y-position. During the setup method the objects are then put into an array. When the draw method is called the ships are placed on the screen and move based on the new x and y positions provided by the looping equation. During the draw method it is defined that if any alien ship reaches the bottom of the screen the Usability Defender dies.

The final class Missile has four properties: x-position, y-position, image, and if it is visible or not. Just like the ship the image is fixed so it is hard coded within the class. Also within this class the code checks for a collision between the shot and the visible target objects.

Prior to the setup phase a new array list is created for the missile objects. Since no missiles are present when the game starts, no code related to creating missiles is in the setup method. During the draw method object missiles are added to the array whenever the space-bar is pressed and at the same x and y position as the ship. If a collision takes place between the shot and any alien ship, points are either deducted or added depending if the array is defined as 'good' or 'bad'.

The draw method also checks to see if all objects with the bad arrays are not visible anymore. If all bad objects are no longer visible and the Usability Defender has enough points, you win!

The library ControlP5 is used in the application to display the score as well as showing the text to indicate if you have won or lost. This "scoreboard" is located in the top right hand corner of the application. For more information on ControlP5 please visit:

<http://www.sojamo.de/libraries/controlP5/>

4.4 The Portal

Usability Defender can be accessed online via the url: www.usabilitydefender.com. This portal outlines the story-line, the players, their descriptions, further information regarding usability, as well as access to the actual game.

4.4.1 The Mission

As the newest recruit for the Starship Userprise you have just been handed the controls for your first mission.

Navigate through space and eliminate all usability threats from the evil alien invaders. Be careful not to shoot your allies while trying to defend the Userverse.

4.4.2 Your Allied Aliens

Ship Sitemap



Providing users with a one-page sitemap not only provides a crutch for navigational flaws on your website but also helps with indexing by Google.

Ship Product-Sorter



Allowing users to filter and sort data is an excellent way to help with information overload.

Ship Breadcrumb



Breadcrumb trails are a great way to visually show the users location and provide easy navigation. Overall an excellent example of how a small detail can help improve user comfort.

4.4.3 The Enemy Aliens

Star Ship Pop-Up



Pop-up's in any form, are the most notorious form of online marketing. Since their conception this intrusive form of advertising has been considered a huge "do-not".

PDF Fighter



PDF's are linear in nature and when used online lack the general principles of linkage and dynamic content that makes the web function. As they are often written for other communication environments such as the publishing world, they often don't follow general web writing guidelines.

The tester's first task is to view the home page located at UsabilityDefender.com and respond to the question, "what do you think this site is about?" The subject responded "it's going to be a fun arcade game."

Too-Small-Text Fighter



It might not fit your design style but a small font is not a friendly font. If a small font design is a must-have you should at least allow your users the ability to increase the font size.

The user is then asked to click on the "play now" button to play the game. The user hits the button and is immediately thrown into the game. Right away the user is a bit overwhelmed by the speed of the advancing aliens.

Ship Non-Color-Changing Visited-Link



The visualization of links is important to online usability. Colored and underlined links have proven time and time again to increase perceived affordance.

It was apparent from this user that different difficulty levels should be introduced. The difficulty levels would simply have the same number of aliens, however have them advance at differing speeds.

Ship Vertical-Scroll:



Vertical scrolling can result in users missing content and becoming frustrated. To make matters even worse this negative usability trait is also a major issue with users who have a low acumen for reading; following text while scrolling vertically can be quite difficult.

For the second of the two usability tests I turned to the services of UserTesting.com. UserTesting.com is a website that connects websites with usability testers. In their own words they are "a crowd sourcing service that provides fast and cheap usability testing (*UserTesting.com*, UsabilityTesting.com FAQ).

For the test users were selected that closely match the targeted demographic. The user is asked what they think the site is about and to play the game. The user correctly identifies what the game is about and plays the game successfully. He does make valuable points about increasing the usability of the website as well as explaining the game more. Based on the comments made by UserTesting.com, a description on the first page of UserDefender.com was added explaining the game and who the "guy" is that is telling you if you win or lose.

5. Conclusion

5.1 Results

Currently the game has just been released and is still in beta. With this in mind version 2.0 will include some updates covered in section 5.3:

Future Aspirations. However, as usability testing is just as important at early stages of development as it is in later stages, therefore two user testing cases have already been completed.

To see the full video of the above mentioned usability test click here:

<http://www.usabilitytestresults.com/Viewer.html?jobs=mQwUaAgqPEc=&u=xwOb5kMExJo%3D>

The first test was done prior to launch. For all intensive purposes the participant owns and operates a small Wordpress Blog and can be classified as a "newbie" to web usability.

Amendment: a third usability test was also done after the website went live. To see the results click here:

<http://www.usabilitytestresults.com/Viewer.html?>

[jobs=w2zuYau8wSI=&u=xwOb5kMExJo%3D](http://www.useit.com/alertbox/20030825.html)

5.3 Future Aspirations

Based on the user-testing results future functionality will mostly be focused on developing game features further. Some enhancements might include: sound effects, a collision detection on the ship with the aliens, storing past scores on a leader board and showing a different image when the ship and/or aliens explode.

5.4 Summary

Overall the game and website have been received quite well. Providing a fun and nostalgic way for the current twenty-something generation to understand best practices for online usability can help propel structured online communication at an even greater speed.

Dry topics such as web usability are important to understand for medium to small sized business as these are the businesses that inject innovation into the marketplace. If these companies keep competition strong online by communicating their unique selling proposition clearly, this will produce nothing but positive results--not only within commerce but also within society.

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