

Practical Approach in Web Design and Usability Issues

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<p>The purpose of this thesis was to demonstrate technologies designing websites with a special focus on usability issues.</p> <p>The research was carried out as both quantitative and qualitative methods. The report was divided into two parts. In the first part, technologies for creating websites were introduced accompanied with practical examples.</p> <p>The second part of the thesis provided comprehensive guidelines about the usability concerns of website design. The website of Haaga-Helia UAS (HH) was used to check and test the usability best practices. Field observation and interviews were used to collect user feedback.</p> <p>The study gave constructive knowledge about the site to the user and effective feedback to the IT department of Haaga-Helia UAS. The study indicated that, in most cases, HH website complies with the best practises of web usability, yet, there are still some usability issues regarding e.g. the search engine, site structure, ads and shortcuts. According to the study, these concepts need to be modified in order to acquire better user satisfaction.</p> <p>This study is a good overview for the beginners who want to become web designers. Furthermore, it offers a compact package of information about various usability theories for those already designing websites.</p>	
<p>Keywords Usability, web design, UX concerning usability</p>	

Abbreviations

WDLC-Website Development Life Cycle

DFD-Data Flow Diagram

MMN- Mystery Meat Navigation

ISO-International Standards Organization

NLS-On-Line System

GUI-Graphical User Interface

WWW-World Wide Web

HCI-Human Computer Interaction

PLC-Product Life Cycle

HTML-Hyper Text Markup Language

CSS-Cascading Style Sheet

RDBMS-Relational Database Management System

UCD-User Centered Design

UXD-User Experience Design

WDE –Web Development Environment

UX-User Experience

ASP-Active Server Page

PHP-Pre Hypertext Processor

GPL-General Public License

ACID-Atomicity, Consistency, Isolation, Durability

GIS- Geographic Information System

HH-Haaga-Helia University of Applied Sciences

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1 Introduction

Back to 21 years, “Web” a three letter word that was first used in March 1989 by the director of **W3C**, Sir Tim Berners-Lee. Along with Lee, Belgian computer scientist Robert Cailliau announces web to use HyperText “ ... to link and access information of various kinds as a web of nodes in which the user can browse at will”(wiki). That is in 1990, after that project started in december for the first time to join the whole world in a single node via internet.

At the moment, web or using internet is one of the most certain things in our everyday life. Almost over 2 billion (2,267,233,742) users are using internet, which counts worlds 34% people are connected through internet (Internet world stats, 2012.) It is being used widely by private, public, academic, business, government networks, scientific, medical, social as well as in every sphere of our life. Thousands of millions net sources are available to use within a mouse click just in front of us.

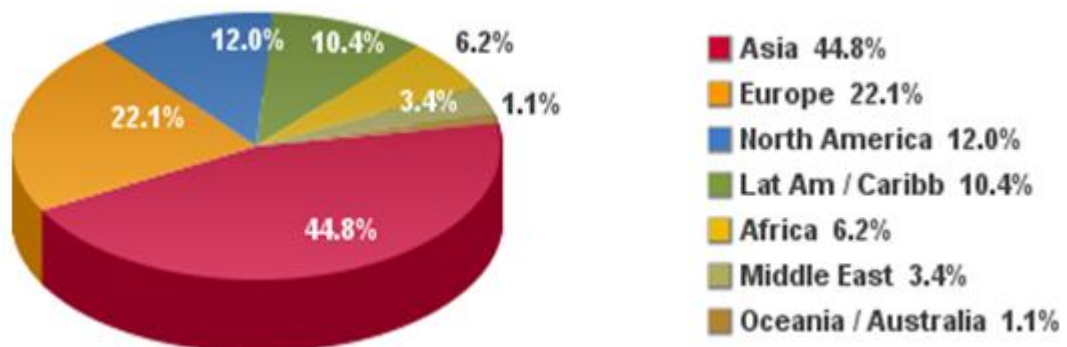


Figure 1: Internet users by world regions by december 2011.

Source:<http://www.internetworldstats.com/stats.htm>

All the net sources are somehow related to a web interface. As the number of users are enhancing in the “world of net”, concerns creating web layout design in accordings because of the different scale of users. At this competitive web world market, usability is a big issue in e-business success. As an example, think about nokia mobile phones, the market share of Nokia in 2010 fell to 28.9%, compared to 36.4% in 2009 (Martin jYoung, 2012.) It is very clear that the downfall of the world best mobile company because of poor usable application compare to iphone, google android etc.

However, in this report one of the key point is to figure out these issues to make a sense “how important is usability while creating an user interface”. In addition, this thesis report will provide an overview in creating a website using the available possible best web technologies. Furthermore, in the end of the report, an usability research using Haaga-Helia website being done to check the usability best practices.

1.1 Thesis objective

Mission Statement

“The mission of this thesis is to give new developers ideas about “how to create a website”. The thesis also provide a comprehensive usability theory along with a research to create the site in more effective ways”.

Vision

The thesis report containing

- A guide to the reader “technologies to create a web site”
- Usability theories
- Confirming the usability issues in design
- Practice to confirm developer’s skills and competences
- Quantitative and Qualitative research compilation

1.2 Thesis topic and scope

The topic of the thesis is “Practical approach in web design and usability issues”. The scope is bounded designing website and best practises of usability.

2 Introduction to web site design

A website is a systemetic and process oriented development. There are many mehtodologies in designing a website. In practice, many traditional and agile methodologies are exists in web devepement. However, the most common and highly used traditional methodology is waterfall. Though, nowadays agile methodologies are also having a rapid trend in software devepement cause of high demand of

customer satisfaction. However, scrum is the most ongoing popular agile software methodology.

2.1 Traditional Development (waterfall methodology)

The key idea of waterfall methodology is that all the processes in this methodology are followed one after another. The process is also commonly known as development life cycle. Here, we will learn some initial aspect about designing a web site using waterfall methodology. According to Skysignal (2010) and KDMI, website life cycle would look like this (figure 1):

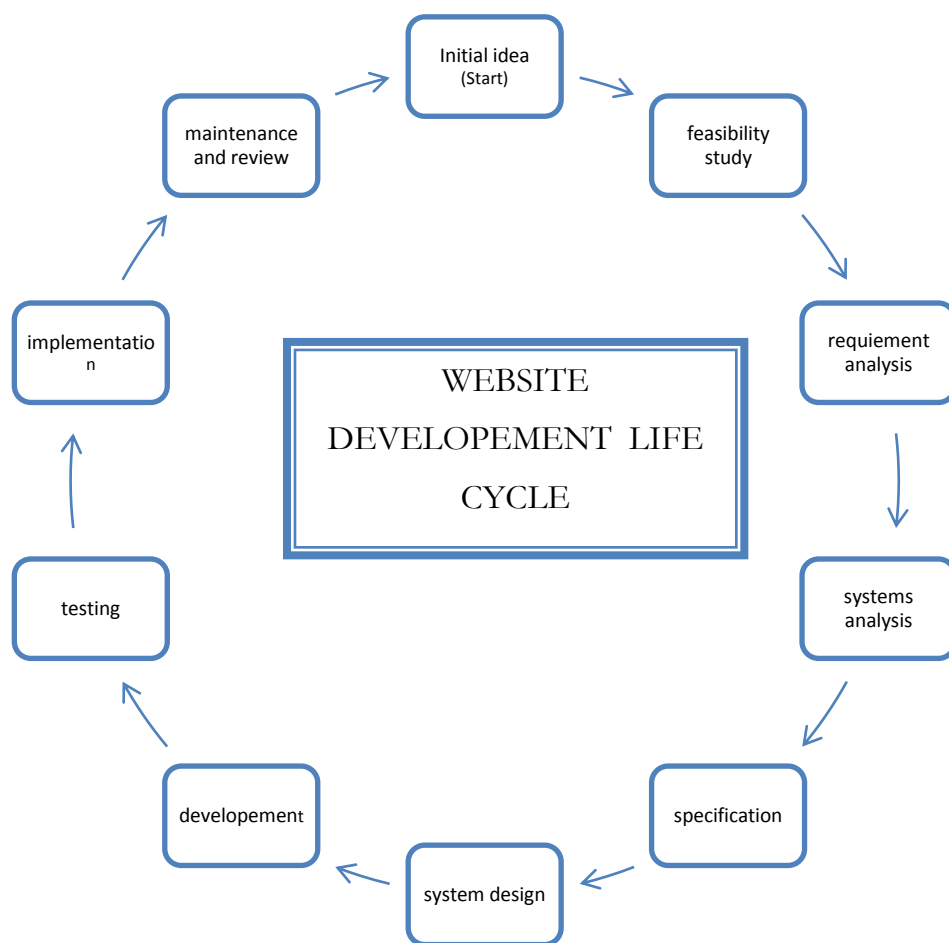


Figure 2: The flow of WDLC

2.1.1 Initial Idea

A website creation must gear up with a initial thought. A development team figure out what will be the purpose of the site, or what need to develop, the mission, vision and the overall goal of the website.

2.1.2 Feasibility Study

Feasibility study is to analyze the outcome of the website design initial idea, that is the new project. In feasibility studies, it is being measured, how or in what extent the new site could be beneficial than the old site. However, it is done with some extensive research by expert decision makers. Feasibility study, specifically, the pros and cons of the desired new website in terms of operational needs and financial involvement. It also describes the object and scope of the project to progress.

However, the key role of feasibility study is to figure out the data flow of the current system. The outcome of the feasibility studies are to make sure the Data Flow Diagram to illustrate the data process flow for the system.

2.1.3 Requirements analysis

Considering the feasibility study, requirement analysis are being done to find out all the applicable solutions for the project. The core idea of requirement analysis is to define the data flow in the system, figuring user specifications, system functions and the process specification for the next level of WDLC.

2.1.4 System analysis and specifications

System analysis corresponds the requirement analysis. According to the requirement analysis documents, “what” and “how” the system will work is defined in system analysis. The scope and environmental overview are created during system analysis. System analysis confirms the technologies needed for the planned system to be embedded (Figure 3). In other words, system analysis is to provide a logical model of the new website.

<i>Tier</i>	<i>Layer</i>	<i>Software Layer</i>	<i>Parts</i>	<i>Description</i>
Client	Presentation Layer	Web Browser UI Layer	<ul style="list-style-type: none"> • XHTML Pages • CSS files • Image files • Cookies 	*Web Browser Client sends HTTP requests. *It gets back only XHTML, CSS, images, cookies as HTTP responses.
		ASP.NET UI Layer	<ul style="list-style-type: none"> • ASPX Pages • Code-behind classes • CSS files • Image files 	On Server
Web Application Server	Application Layer	Application Logic Layer	<ul style="list-style-type: none"> • Controller classes 	On Server
		Data Access Logic Layer	<ul style="list-style-type: none"> • DAL classes • Database class 	On Server
Database Server	Data Storage Layer	DBMS	<ul style="list-style-type: none"> • Database Server • .mdf Database file 	On Database Server

Figure 3: An environmental view of Website design using ASP.Net

2.1.5 System design

This is more practical part of the WDLC. From all the scratches done before, software developers creates all the logical performance into physical design. That is, the whole processes are being built from theory to practise. The diagrams are accelerated through more

logical and applicable way. Mostly, in this step logical operations, models are carried out into physical one.

2.1.6 Development

This is the final phase of the creation process. Based on all the analytical and design phase documents and database, the actual code is written to build the physical site. In other words, all the programming codes are written in this phase. And all the required technological demands are fulfilled to compile the website. However, this section is done by the software developers.

2.1.7 Testing

After finishing all the cycles the site is finally ready to publish. However, does the site really work fine? Is there any system bugs or errors? Or is there any runtime machine error? How about the concurrency control? To find out answers of all these questions, tests are being done. There are many tests exist. System test, usability test, unit test, component tests etc. are mostly done in this phase. Though, depending of the size of the project, small websites or companies are not interested to use money for that.

2.1.8 Implementation

Implementing the product to the user is being done in this phase. The website could be added or embedded to the older system or a brand new website is published via the web server.

2.1.9 Maintenance and review

In most cases after installing the product, errors or bugs are found quite often while using the product in the user environment. All the errors are reported and a review is being done. Generally, adding functionality and finding errors are so common that this phase is continue until the product is thrown away.

2.2 Agile development (Scrum)

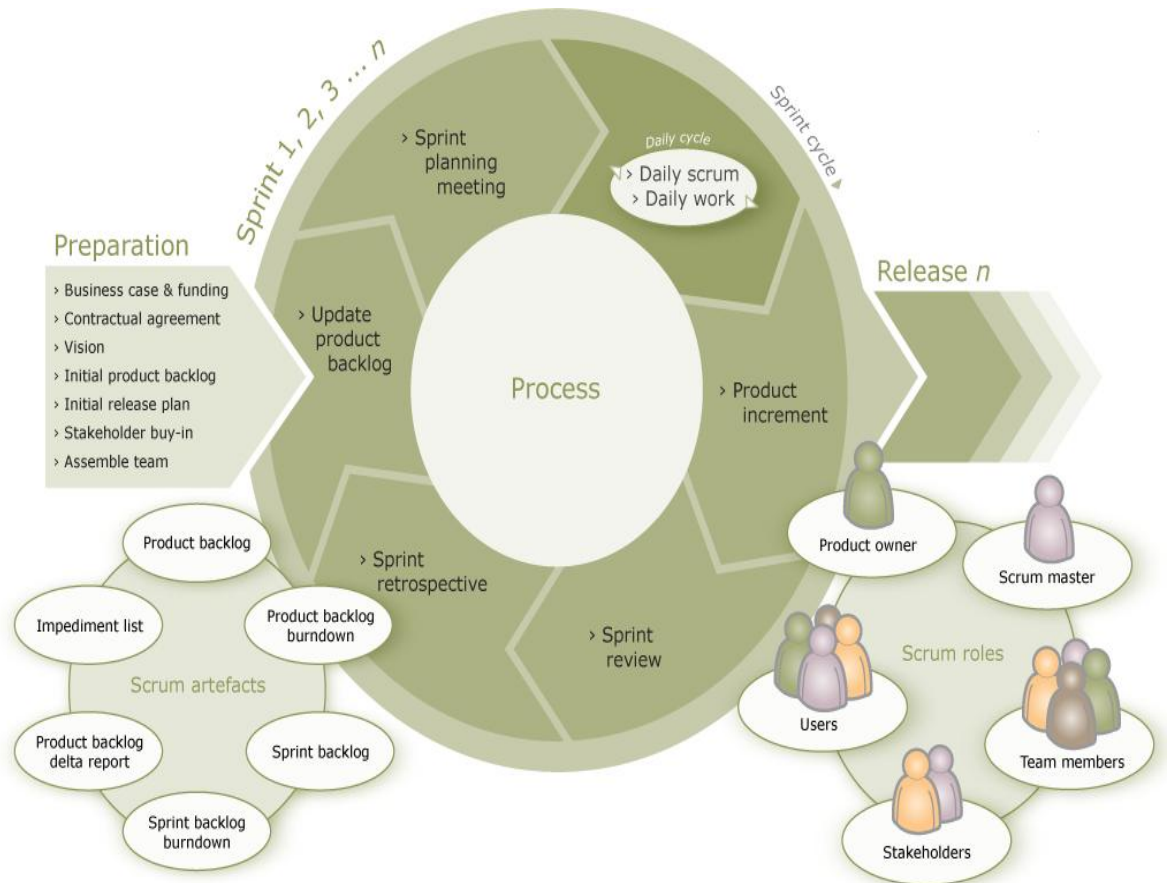


Figure 4: PLC (development cycle in scrum)

Source: <http://blog.3months.com/2010/01/10/illustrating-scrum-a-new-and-improved-scrum-diagram/>

Agile development is the new approach to system development which is based on both defined and black box process management. It promotes adaptive planning, evolutionary development and delivery, a time-boxed iterative approach, and encourages rapid and flexible response to change. Among many other agile development methods, scrum is one of the popular methods used widely for the rapid change in system requirements. However, SCRUM is an enhancement of the iterative and incremental approach to delivering object-oriented software.

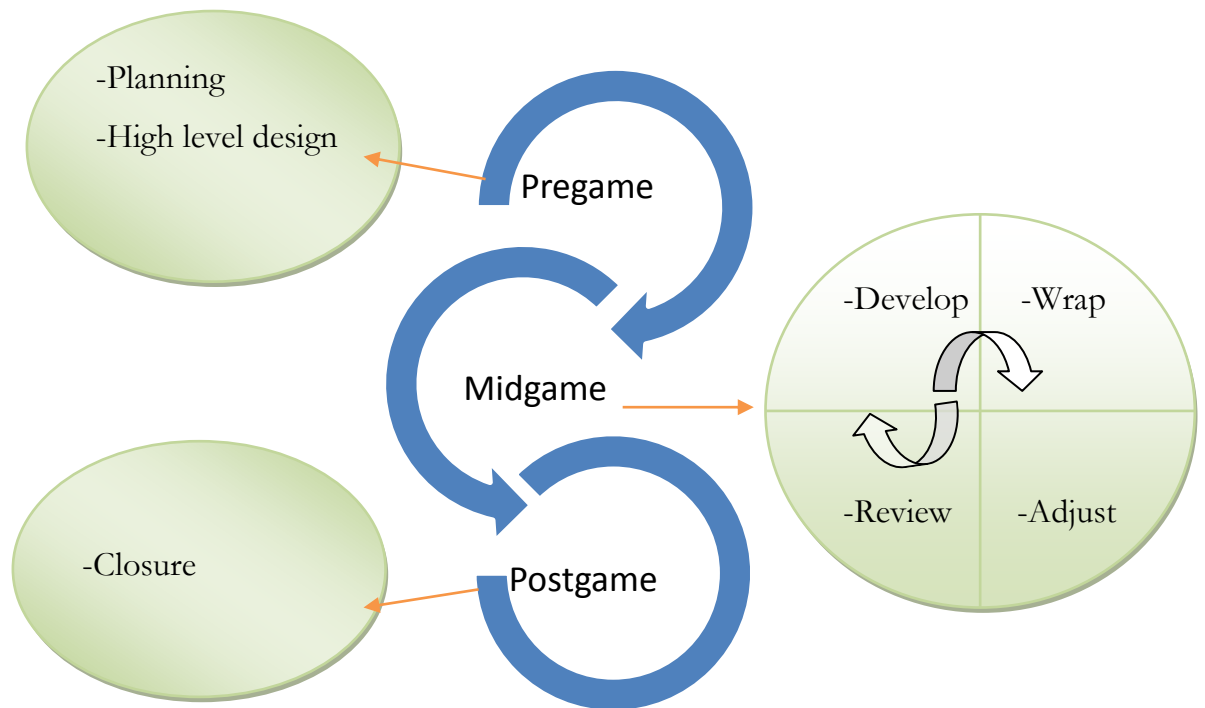


Figure 5: Scrum development overview

According to scrumethodology (2009), Scrum development has three main phases (figure 5).

2.2.1 Pregame

Planning

The first development phase is to plan for the project. A comprehensive backlog list is being created with the estimated time and desired functionality. Product pockets (objects) for backlog items are defined for the project. In different cases, a review of the previous backlog is also done during this phase. To compile the best for the sprint a project team is selected for the new release. The clear definition of risks and appropriate risk management are defined for the project progress. Estimation of release cost, materials, training, development tools, and all other development cost are clearly defined in the end of all the planning tasks are over. Finally, funding and managerial approval is done to kick off the project.

Architecture/High Level Design

In this phase of development, a clearly defined backlog is being made. All the changes in backlog is identified and changed for the next backlog. A refined architecture is

being created to support new contexts and requirements. The possible hindrance for implementing changes are figured out. Team management approach, review meeting structure are redesigned in possible cases.

2.2.2 Midgame

This development phase is an iterative cycle of development work. This process is also called “Concurrent Engineering”.

The defined process is done in a timebox frame and use a role defined approach known as “Sprint”. A Sprint is a set of development activities conducted over a pre-defined period, which is usually one to four weeks. The duration is decided based on the task complexity and degree of risk assessment. Sprint speed and intensity are monitored every next working day.

The four iterative processes are (Figure 5):

Develop: Defining changes needed for the implementation of backlog requirements into packets, opening the packets, performing domain analysis, designing, developing, implementing, testing, and documenting the changes. Development consists of the micro process of discovery, invention, and implementation.

Wrap: Closing the packets, creating an executable version of changes and how they implement backlog requirements.

Review: All teams meeting to present work and review progress, raising and resolving issues and problems, adding new backlog items. Risk is reviewed and appropriate responses defined.

Adjust: Consolidating the information gathered from the review meeting into affected packets, including different look and feel and new properties (Ken Schwaber, 2009).

All these processes are done in a organized group of team members. Each team assigned for certain backlog item. In each scrum team, 6-9 members play a role. The most important role involved in scrum is the Stakeholder. As the Stakeholder is the one who have desires, and needs. There are also the scrum master, team members (developers) and the product owner.

However, the owner is responsible defining the backlog. Scrum master defines, reviews, controls and leads the team by time. Developers perform and select the task based on the daily review meeting. However, every sprint is consists of 1-4 weeks. In each sprint four meetings are conducted: **The Sprint Planning Meeting** (the first meeting for the sprint), **The DailyScrum** (everyday morning, also called standup meeting), **The SprintReview Meeting** and (Occurs in the end of the the sprint), **The Sprint Retrospective Meeting** (held right after the sprint review meeting).

2.2.3 Postgame

The final phase of development is called “Closure”. This is the release phase of the software product. When the project requirements with required quality is confirmed then it is announced the closure of the product. The key tasks in this phase are mostly doing all the tests to confirm the new release is ready to publish. Integreation test, unit test, user documentation, marketing material preparation are the major and closure tasks for that release.

3 Desing tools

To develop a website the first software tool we need is a web developement environment (WDE). Notepad, **Flash, Hotmetal, Site Builder, Xampp, microsoft visual studio** etc. were some of the most popular tools for designing websites.

However, beacuse of the usability to the source of data, WCM (Web Control Management) systems are also becoming popular now a days. Polopoly, Web CMS, OpenText Web Site Management, WebGUI, Drupal, Joomla!, Jumbo, PHP-Fusion, Phpweblog, WordPress, Plone, Typo, Radiant, Zotonic are some of the most popular WCM in todays web development. WCM offers developers to create and manage website contents with relative ease. It has built- in-automated templates, Scalable feature sets, document management, multilingual option, easily editable content etc. (wiki).

In the following part a productive introduction will be provided to know about html, css, database design, desing phases, and other possible technologies.

3.1 HTML

HTML-HperText Markup Language is a markup language to show all the data to print in the screen. Basically, most of the contents are hold in HTML file. HTML file is a hidden code behind file. It starts and ends with “<” & “>” sign. However, in the latest addition of HTML that is XHTML, it is recommended to use start “<tag>” and should be finished by “</tag>” end tag. Here “/” refers to the end of the section. However, there are few exceptions in this rule, but basically it is recommended to use an end tag in coding.

HTML file has its own structure. Whatever coding languages are being used with it, the structure remains the same. According to W3schools (2012), HTML structure(Figure 6) looks like this:

```
<html>
  <head>
    <title>Search Engine Optimization -
    HTML structure is important</title>
  </head>
  <body>
    <h1>Why is it important?</h1>
    <h2>Reason 1</h2>
    <h3>Sub-Reason 1</h3>
    <h2>Reason 2</h2>
    <h3>Sub-Reason 2</h3>
  </body>
</html>
```

Figure 6: HTML structure

In the image above, the “<title>” section is basically represents the site name or the company name it is being used for or what the page related to. When CSS (Cascading Style Sheet) is used, the reference is being put there right under the “</title>” section. Finally, the body part contains all the files, information, forms, as well as any other contents of the website.

Contents in HTML page

Basically, HTML has two parts. The Head and the body. Head contains Title, css pointer, metalink etc.

Head Information

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
<head>
<title>My first web HTML page </title>
</head>
```

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">

-this declares the document to be **HTML 4.01 Transitional**. HTML 4 Transitional includes all elements and attributes of **HTML 4 Strict** (validation). In the **HTML 4.01 Transitional** adds presentational attributes, deprecated elements, and link targets.

Body

```
<body bgcolor="#FFFFFF">
.
</body>
```

“<body></body>” tag consists the content of the website. It includes many other blocked level element to fulfil the content composition.

Basic text attributes

<i>Tags</i>	<i>Output</i>
<h1>Heading 1</h1>	Heading 1
<h2>Heading 2</h2>	Heading 2
<h3>Heading 3</h3>	Heading 3

<code><p>Paragraph</p></code>	Paragraph
<code>Bold</code>	Bold
<code><i></i></code>	<i>Italic</i>

Div elements

Div element is used to indicate a specific section on the webpage. Div element is a block level element. Block-level element typically contain inline elements and other block-level elements. As an example:

```
<div style="color:#00FF00">
  <h3>This is a header</h3>
  <p>This is a paragraph.</p>
</div>
```

In this piece of code `<h3>` and `<p>` are block level elements which are holded by “div” level element. Div element is used to make the layout of the page. That means, as it can hold other elements, div is designed to hold all these elements inside it’s own container.

Table attributes

An example to create a simple table:

```
<table border="1" cellspacing="2" cellpadding="4" bgcolor="#FFFFFF" >
<tr>
<td>Table cell</td>
<td>Table cell</td>
</tr>
<tr>
<td>Table cell</td>
<td>Table cell</td>
</tr>
</table>
```

In here, the border="1" represents the width of the border, cellspacing is the gap between the cell to the next cell, cellpadding refers the gap between the cell and the border of that cell.

Bullet points

In navigation list or content list “ “ tag is used to refer the content of the list. “” is the tag to write the list content elements.

```
<ul>
<li>BulletPoint</li>
<li>BulletPoint</li>
<li>BulletPoint</li>
</ul>
```

Output of the code:

- Bullet point
- Bullet point
- Bullet point

Here, instead of “ “ tag “” could be used to use as a number list.

Images

```
<imgsrc="/graphics/image.gif" border="0" width="100" height="100" alt="My Image"
hspace="5" vspace="5" align="right">
```

Note that, the image we would like to use in our site should be in the same place where the HTML file is. Otherwise, we have to refer the place where it is located. Image file could be any format. However, .gif,.jpg are the most common format among all. For web design, it is good to create pictures in photoshop or any other photo editing softwares, to confirm the resolution, so that the picture we use in website will be the same in size than the picture being edited.

Links

Links are the way to navigate to other pages. It could be text or image.

```
<a href="/section/page.html">Linked text</a>
```

Link also can be used as an image.

```
<a href="http://www.site.com/section/page.html"></a>
```

Or

```
<imgsrc="planets.gif" width="145" height="126" alt="Planets" use map="#planet
map" />
<map name="planet map">
  <area shape="rect" cords="0,0,82,126" href="sun.htm" alt="Sun" />
  <area shape="circle" cords="90,58,3" href="mercur.htm" alt="Mercury" />
</map>
```

In case of using “map” tag for linking image, cords (co-ordinators) is the key to locate the position of the link in the image.

closing tags

```
.
</body>
</html>
```

In the end of the body part, the body section must be closed and also need to close the html tag that start in the first line of the code.

HTML5

At the latest addition of HTML5 in 2010, web sites are being much more interactive and more UX oriented. Here is provided some latest attractive addition to html (W3schools 2012).

Tag	Description
<article>	Defines an article
<aside>	Defines content aside from the page content
<bdi>	Isolates a part of text that might be formatted in a different direction from other text outside it
<command>	Defines a command button that a user can invoke
<details>	Defines additional details that the user can view or hide
<summary>	Defines a visible heading for a <details> element
<figure>	Specifies self-contained content, like illustrations, diagrams, photos, code listings, etc.
<footer>	Defines a footer for a document or section
<header>	Defines a header for a document or section
<hgroup>	Groups a set of <h1> to <h6> elements when a heading has multiple levels
<mark>	Defines marked/highlighted text
<nav>	Defines navigation links
<progress>	Represents the progress of a task
<section>	Defines a section in a document
<time>	Defines a date/time
<wbr>	Defines a possible line-break

New Media Elements

HTML5 offers new elements for media content:

Tag	Description
<audio>	Defines sound content
<video>	Defines a video or movie
<source>	Defines multiple media resources for <video> and <audio>
<embed>	Defines a container for an external application or interactive content (a plugin)
<track>	Defines text tracks for <video> and <audio>

The new <canvas> Element

Tag	Description
<canvas>	Used to draw graphics, on the fly, via scripting (usually JavaScript)

Some code example of HTML5:

Video editing in web:

```
.  
  
<video width="320" height="240" controls="controls">  
<source src="movie.mp4" type="video/mp4" />  
</video>  
  
.
```

Note that, only MP4, WebM, and Ogg video formats are allowed in html.

Geolocation:

```
<body>

<p id="demo">Click the button to get your coordinates:</p>

<button onclick="getLocation()">Try It</button>

<script>

var x=document.getElementById("demo");

function getLocation()

{

if (navigator.geolocation)

{

navigator.geolocation.getCurrentPosition(showPosition);

}

else{x.innerHTML="Geolocation is not supported by this browser.";}

}

function showPosition(position)

{

x.innerHTML="Latitude: " + position.coords.latitude +

"<br />Longitude: " + position.coords.longitude;

}

</script>

</body>
```

3.2 CSS (Cascading Style Sheet)

Cascading style sheet is a file which compose the web site color, font, size, position, layout etc. of HTML page elements. CSS file could work from either internal or

external sources. There are three common ways to declare css in HTML pages: **Inline css, embedded css and external source** (Tizag 2008).

Inline CSS

CSS could be used as an inline statement in html, like:

```
<p style="background: blue, color: white;"> A new background and font color with inline CSS </p>
```

Embedded

Or it could be used as an **embedded in the same html page** element. The embedded code is attached in the **<head>** section of the page. An example:

```
<head>
<style type="text/css">
<!--
p {
background: blue;
color: white;
}
-->
</style>
</head>
```

And we could use p (paragraph) properties in the body section. So all the text in the `<p></p>` Properties will automatically cascade the background and font color to white.

External sources

The third and the most effective and reasonable way to define the css is declaring it in the external file(s). The external file is used as a reference where it is called from the html page. However, the file is used as a simple text file. The file is being read as a class or ID of a certain element of html of that html page. The page link of the css file page should be referred in the head part of the html page. External css file is convenient in a

way that we don't have to change any page content of the html page but just to make the specific layout change of a specific element.

An example:

The css file use and declaration in the html page:

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
<head>
<title>web to learn</title>
<link rel="stylesheet" type="text/css" href="test.css" />
</head>
<body>
<p>This is a test website for learning</p>
.
.
</body>
</html>
```

In the external css file

```
p {
background: blue;
color: white;
}
```

Note that, html and css, both of these files should be under same directory. The css file must be called in the html page in the head section.

However, while using css, elements could be referred via class or ID element. Mostly, if any element is being used in several design view than we have to use class or ID element. Class declaration is used by a “.” Sign before declaration name and ID is used “#” sign before declaration. Both do the same job, though ID is specific to only one element where class can declare for many other of that same elements.

An example:

```
.  
.   
<body>  
<div class="head">  
<p>Hello this website is to practice</p>  
</div>  
<div ID="body">  
<p></p>  
</div>  
<div ID="Links">  
<ul>  
<li></li>  
<li></li>  
</ul>  
</div>  
<div class="head"></div>  
.   
.
```

So the clear difference between class and id is that class name can be used for many elements. Whereas, id name is used for only one element.

3.3 Databases (SQL, Mysql, Oracle, DB2..)

A database is a set of collections of data. All data stored in the database management system and through data query the data return back that are asked for. In psychological understanding, it could be imagine as an electronic filing system.

Database is a systematic program to store and retrieve data from a large amount of data. Technically, database is tables. And it consists of rows and columns. The tables are organized regarding the data and have a unique reference to each row of the data. And in one database management, there could have many databases. However, databases are created in a relational method to have integrity between them.

In recent current web world, database management system basically means the relational database management system (RDBMS). In past, text file, excel sheets also used as data store. However, because of the need of complex and enormous figure of data, DB management software products are there to handle complexity of data store. The process of handling these complexity of data is called relational database. However, MYSQL, SQL.Net, DB2, oracle etc. are the most popular database management systems now a days. And there are many data query methods exist. SQL, mysql, oracle, db2 are the most common methods used (Haithcoat).

In addition, In very recent trends, NoSQL appears in the database management system cause of its demand to store huge amount of data. Google and Amazon, for instance, are using this database management system. The key point about NoSQL is that it does not consistent as relational database, cause the giant number of data does not follow the same data schema all the time. Furthermore, it been been optimized that relational database are not always confirms the ACID (atomicity, consistency, isolation, durability) guarantee of data. Instead, NoSQL use pair key-value what convince to convey large set of data into database and gives a real time analysis about the data. Some remarkable NoSQL DBMS could be:

Wide column store: Hbase, Hypertable, Amazon SimpleDB

Document store: MongoDB, CouchDB, ThruDB, SisoDB

Key value store: Dynamo, membase, Riak, Chordless, Scalaris, Kai, HasterDB, Maxtable, Allegro-c, Hyperdex

Graph Datastore: Neo4J, Infinite Graph, SonesInfoGrid, HyperGraphDB, Trinity, AllegroGraph, Bigdata, FlockDB (twitter)

Object Databases: db4o, Versant, , Perst, Magma, NEO, PicoLisp, EyeDB, HSS Database(C# code), Framerd

XML Databases: Mark Logic Server, EMC Documentum, XDB, Base, Berkeley DB

Multivalue Databases: U2, Reality, OpenQM, jBASE (NoSQL.com).

3.4 Javascript

Javascript is a scripting language. It works in the client side and it runs inside the client browser to fetch resources from server. Generally, javascript is used for:

- detecting the user location, OS
- validates input
- show date and time
- execute HTML pages without contacting the web server.
- setting and reading cookies
- advertisements in website
- shopping cart and forms
- giving alert in fault scenario

However, javascript can be used inside HTML or as a source file (Grace2006). Here are some examples:

An Inline code example of javascript:

```
<html>
<body>
<h1>My First Web Page</h1>
<script type="text/javascript">
document.write("<p>" + Date() + "</p>");
</script>
</body>
</html>
```

As an external source code:

```
<html>
<head>
</head>
<body>
<script type="text/javascript" src="main.js">
</script>
<p>
The actual script is in an external script file called "main.js".
</p>
</body>
</html>
```

Note that, “main.js” should be under the same directory of that HTML file.

3.5 Jquery

Jquery is a latest addition in web designing . It was first published in 2006. The goal of jquery is to make action handlers more interactive and user attractive. However, Jquery is a JavaScript Library. Jquery development is increasing quite fast cause of its HCI integretion success. For instanse, Jquery ajax is a very effective for dynamic page load, where the content is only updated instead of buffering the whole page. Javascript jquery and all its methods are open source. It is quite easy to add in website as an library function to make website more attractive look with effectiveness (Jquery 2010 ; wiki 2006).

Here is an conceptual view of how jquery ajax works (figure 7):

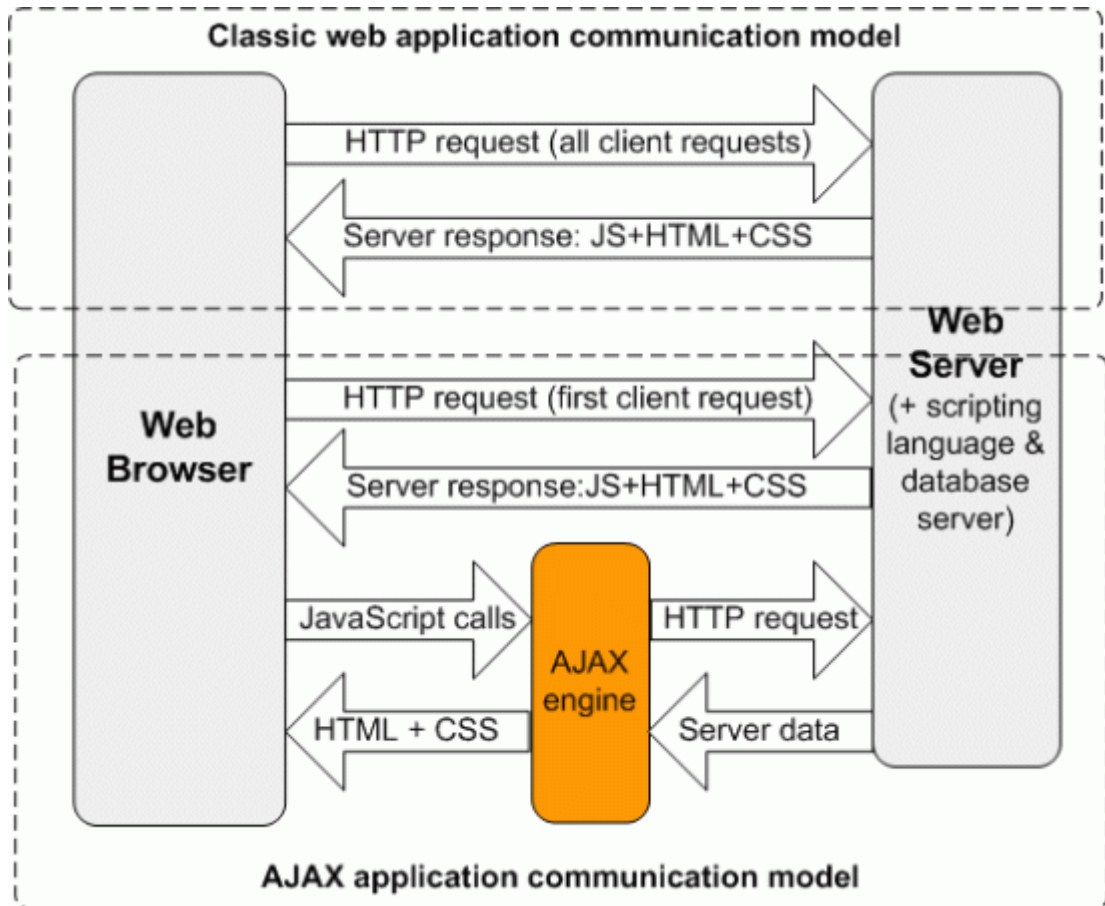


Figure 7: Ajax conceptual view.

Source: <http://stackoverflow.com/questions/1510011/how-does-ajax-work>

3.6 ASP, PHP

ASP And PHP both are server side script languages. They both use to create dynamic webpages to interact with the client side browser. e.g fetching data from database server. The key different between ASP and PHP is that ASP is owned by microsoft and PHP is under GPL(General Public Licence). Technically, ASP syntax are based on microsoft visual basic program whereas PHP systax are composed using java, c programming languages. (Brown 2012).

Here is a conceptual view of “how server side script work for web server”. In the example, PHP file is being shown to fetch from web application server (Figure 8).

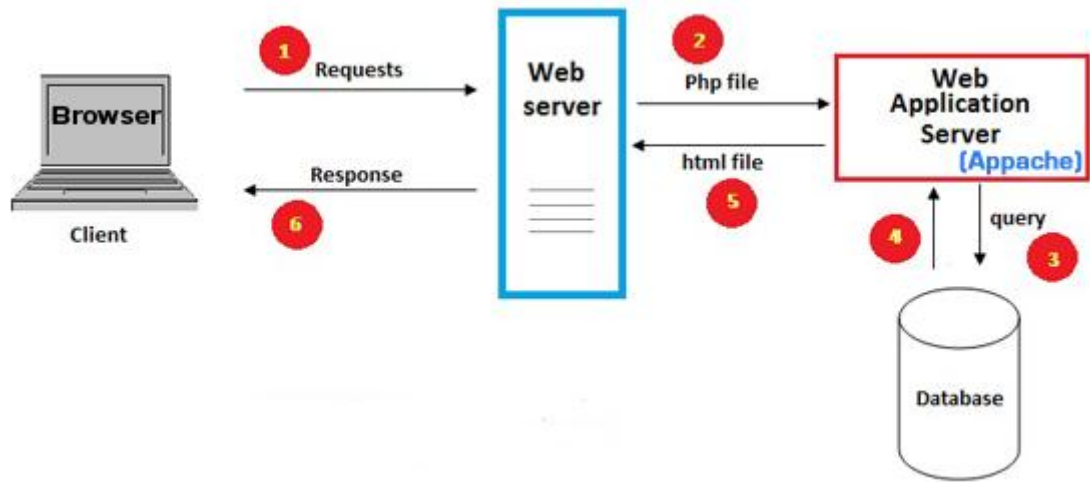


Figure 8: How server side script works

4 Usability

4.1 Background of Usability

Usability is a term to describe how easy to use a system or a web design. It analyze the user experiences, finds the difficulties and finally, provides guideline to solve the problems. Usability is very important to make the optimize use of the created design to fulfill user needs.

The essence of usability is mostly to create a user friendly web interface to use the system effectively. In addition, as the latest world is becoming closer with the web. Approximately, over 2 billion people are using the net every day (Internet world stats 2012). This is why, an user friendly web design is important to the e-world to save users time, attention and confirming the effectivity of the site.

The most common interests for usability studies are to make the web easy to learn, easy to follow, reducing confusion, fulfillment of customer needs, site efficiency, allowing users enable to error correction, comprehensive metaphor, giving consequence information's, readability and an overall guideline of the website. For the IT companies, usability becomes popular for its user research to build the right design for the right user, location and ethnics. It is very established that website that are being made through usability, confirms user satisfaction and system reliability.

According to Microsoft corporation (2000), among many attributes usability has some common question to answer during its analysis.

-Satisfaction : Does user get all the functions they need in the defined way?

-Learnability: How easy to use the system or how easy to play it around?

-Memorability : When user comes back to the site, is it easy to recall the process easily ?

-Efficiency: How fast the system could be used once it is learned?

When a system is being usability tested, all these questions are reviewed and testified.

4.2 Definitions

According to ISO “The extent to which a product can be used by specified users to achieve specific goal with effectiveness, efficiency and satisfaction in a specific context of use.”

“Usability really just means making sure that something works well: that a person of average ability and experience can use the thing-whether it’s a website, a fighter jet or a revolving door-for its intended purpose without getting hopelessly frustrated”. (Krug, S 2006.)

“User experience on the web can be loosely defined as the sum total of a users satisfaction with your site. System usability, which is closely related to user experience, has many components, including ease of learning, efficiency of use, memorability, reduced number of user errors, and subjective satisfaction”. (Jacob Nielsen.)

4.3 The History of Usability

Not surprisingly, in the early age of the web, usability was not been considered as an important issue. Most of the web has been published more like a literature article or alike magazines. So, the question is when actually usability is started to be concerned?

Back in 1960-70, after the invention of On-Line System (NLS), the computer was being used alike today's Unix operating system. User needed to memorize the commands and had to know how to use the functions to make computer works. However, it had a mouse driven cursor and multiple windows command and manipulated by hypertext. Usability issues start coming to developers by then. As part of the primary success of research, the **Xerox Alto** was an early personal computer developed at Xerox PARC in 1973. In progress of that, in 1981, Xerox Corporation announced **Xerox 8010** Information System, which is known as the first commercially produced GUI computer. It includes a window based graphical bitmapped display interface, folders, icons, mouse, Ethernet networking, file servers, print servers and email system (wiki 2012).

By then, User don't have to think about the command line to tell computer to do something. However, user just need to learn to use the graphical commands and because of the ease of the use many people started to become involving using and having a personal computer.

However, as the number of user were increasing developers were started concerning to make the "use(r)+ability" as a great concern to fulfill their needs. In the 1990s, usability was being taken as a serious issue, technically after the creation of WWW (World Wide Web). Interface developers were started to develop practices of usability engineering to design and testing softwares.

In the twentieth century net world, where more than 2 billion people are using GUI, usability is now highly prioritized to desing websites or any HCI designs. Many studies and research is being going on to make the applications as simple and user friendly as possible, in a effective way. In todays, an application success is mostly based on Usability rather than multiple fucntionality. More clearly, Interfaces should be clearly functioned confirming the issues of user needs and satisfaction. However, because of this success factor of creating such usable interfaces or HCI applications, Usability practices enrich with many UX developeps using sophisticated techniques and approaches to improve Web site's and application's usability to confirm the overall success of the website.

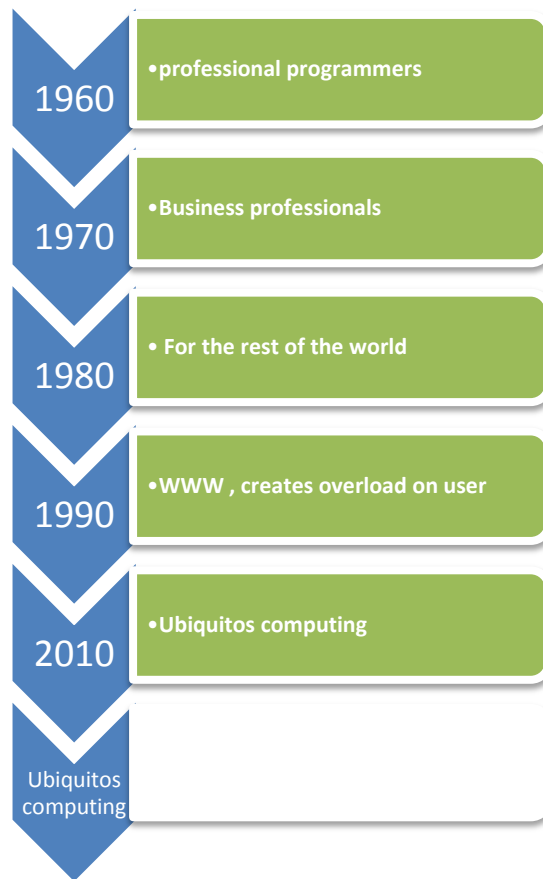


Figure 9: The flow of change in computer use

4.4 Why Usability is Important in web design

Lets imagine a scenario: A web designer is hired to design or redesign a website. The stakeholder provides the designer a fix small amount of budget, with no user experience concerned, no idea about user expectation and no overall scenario of the site is estimated. They have given 15 days of time to create a prototype and finally, the site has to be built within 8 weeks period.

However, the designer could still take the offer as he/she needs a work and of course, no specific qualification is needed. However, after doing 12 hours hard work a day, the designer is abled to create a demo after two week and finally after 8 weeks period the designer manage to launch the site. The client is so happy, cause the website is

attractive and flashy. They rewarded the designer. However, after couple of days, they start complaining a lot about the site. The key point of their complain was that the site is looking good but it is not usable from user prospective.

So how the designer could resolve this problem ? The client doesnt know why users are complaining neither the designer, the scenario becomes a complete disaster. I guess the scenario gives an idea “why usability is so important to web design”.

The most common mistake in web design was that web designer or developer could not totally understood that the typical user are not them. Developers or web experts have more knowledge of the system than the end user. However, they typically use jargon , and make difficulties to the website. There could have easy to use protocols for the developers but not for the user. So it is essential that user are not losing their attention to use the website. Moreover, it should provide an easy approach to upgrade user experience to the provided services. Usability is being adopted to web design not for the website itself but actually for the typical end users. This is how usability is becoming more poplular to the web producers to satisfy user needs (Alision1999, pp. 34-37).

According to the International Standards Organization (ISO) "Usability is the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use." According to market research from Gartner Group, 50% plus of online sales are lost because visitors can't find what they are looking for! Usability is especially critical in an e-commerce web site. The first law of ecommerce states:“If the customer cannot find the product, then the customer cannot buy the product."

However, it is obvious that if users get what they are looking for, the number of user of the site will grow, so does the success of the website. In reality, most commonly websites were “eye-catching” designed, without understanding the need of the users. And many websites could get applause because of the flashy design but they might not appreciated to the user in terms of usability.

4.5 Benefits of Usability

Usability makes the high rates on **business goals**. A successful user centric website provides :

- less content management time
- follows a logical sequence
- meets business objectives
- high conversion rate
- fault tolerancy
- easy to update
- doesn't waste any resources
- provides a positive and successful brand image

Usability confirms **user rates**. A successful user centric website provides:

- comforts to use
- enjoys their web experience
- feels to use again
- get sufficient feedback to use
- always available
- quick response

Usability confirms all these attributes by testing websites and enrich the customer satisfaction, what confirms the business success, as well. To summarize, usability is an important issue not just to make user happy but also the success of the website in terms of business, indeed. More practically, they are co-dependent (Nieslon 2005; Collony2006).

4.6 Psychology Behind Usability

Baby-Duck-Syndrome

Human psychology works in a way that it always getting hard to change to move to a new design. Visitors always appreciate the design they already learned and they would like to compare a new design with the old design. That is why, consistency in web

design is a very serious issue. Users like to follow in the process within the frame look, and our brain always feel comfortable about “What we know”. Symbols that are already used to describe as a shut down button in microsoft windows, are also being used in many other system as logout button where people already understand the meaning of the sign. And the easy and comfortable the design, the better the user experience (IBM 2005).

Banner-Blindness

In most cases, users are pretty effective finding the findings they want from the site. The meaning is, users doesn't like to concern about the unnecessary adds, or info in the site. And mostly users avoid all kinds of advertisement or banner that are pop up or blink in the site. Unfortunately, sites that are having pop up adds , are mostly annoyed by users and decrease the quality of the site being made (Nielsen 2007).

Lazy reader

Mostly user roll over their eyes for the information they looking for. Many user's have a tendency to move away from the page if it takes time to upload the site content. In website, mostly user don't like to read so much. The information that pops up in the glance are mostly accepted by the user. So the website should be visually informative rather than textual. Of course, it depends the background of the site and its ideal user prospective (Lesley 2010).

No Scrolling

This is almost same psychology people have using the site. They read the info until the fold and if they don't find the information, they move away. Scrolling is mostly an old fashion in web design. However, it attempts that some typical users agreed to use scrolling what is over fold. Jakob Nielsen's study (in Prioritizing Web Usability 8) shown that 77% users won,t scroll, only 23% users scroll while visiting a website for the first time. This is why it should be considered as a serious issue to select key content placement on the website. In addition, if the page content is long and the designer is decided to have scrolling, then it should be confirmed that the scrolling speed is good enough to not to bother user patience. And horizontal scrolling must be avoided (U.S. Department of Health & Human Services).

However, technically three key things are considered to be in the page without scrolling and above the fold.

1. Name of the website.
2. Value proposition of the website (i.e. what benefit users will get from using the site).
3. Navigation for the main sections of the website that are relevant to the user.

Basecamp website (figure 10), could be a good example .

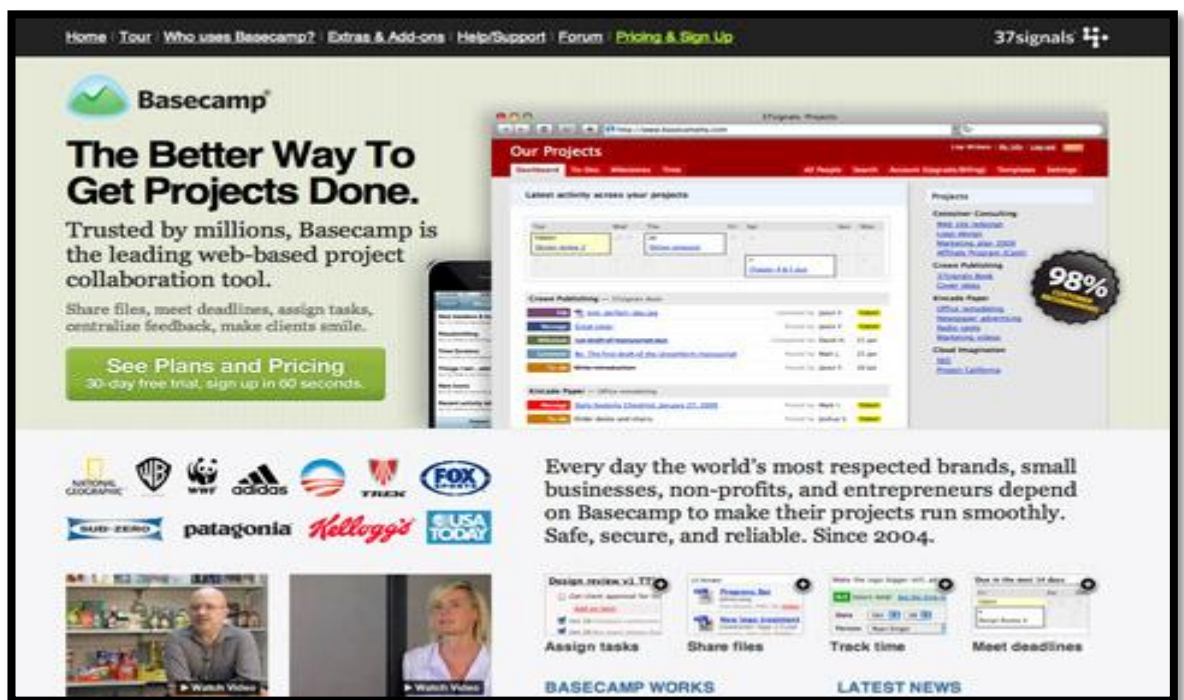


Figure 10: No scrolling web page. Source:

<http://uxdesign.smashingmagazine.com/2009/09/24/10-useful-usability-findings-and-guidelines/>

Gestalt principles of form perception

These principles are the fundamental rules of human psychology in terms of human-computer-interaction-design.

-The law of proximity posits that when we perceive a collection of objects, we will see objects close to each other as forming a group.

-The law of similarity captures the idea that elements will be grouped perceptually if they are similar to each other.

-The Law of Prägnanz (figure-ground) captures the idea that in perceiving a visual field, some objects take a prominent role (the figures) while others recede into the background (the ground).

-The law of symmetry captures the idea that when we perceive objects we tend to perceive them as symmetrical shapes that form around their centre.

-The law of closure posits that we perceptually close up, or complete, objects that are not, in fact, complete (Soegaard 2009).

The Self-Reference Effect

The self-reference effect is something that is only referred to the user. User can remember of the website visual effects what user already experienced. It is always common that things that are related to own observation are better remembered than those aren't truly related to us. Mostly this effect is important for web writing. And it helps to make the communication easier between the user and the author (wiki 2012).

Eye tracking

Most of the net user use eye tracking method while using a new website. Eye tracking is justifying objects size or concentrating on some points of the website is called eye tracking. Web designer must be concerned about this eye tracking cause this is the key issue to catch new web user for that site. More specifically, the main content and the site icons should be built so to attract the tracking from the first look to understand and use the site comfortably. The clear the focus the better the user experience (SimpleUsability 2011; Gould& Zolna 2012).

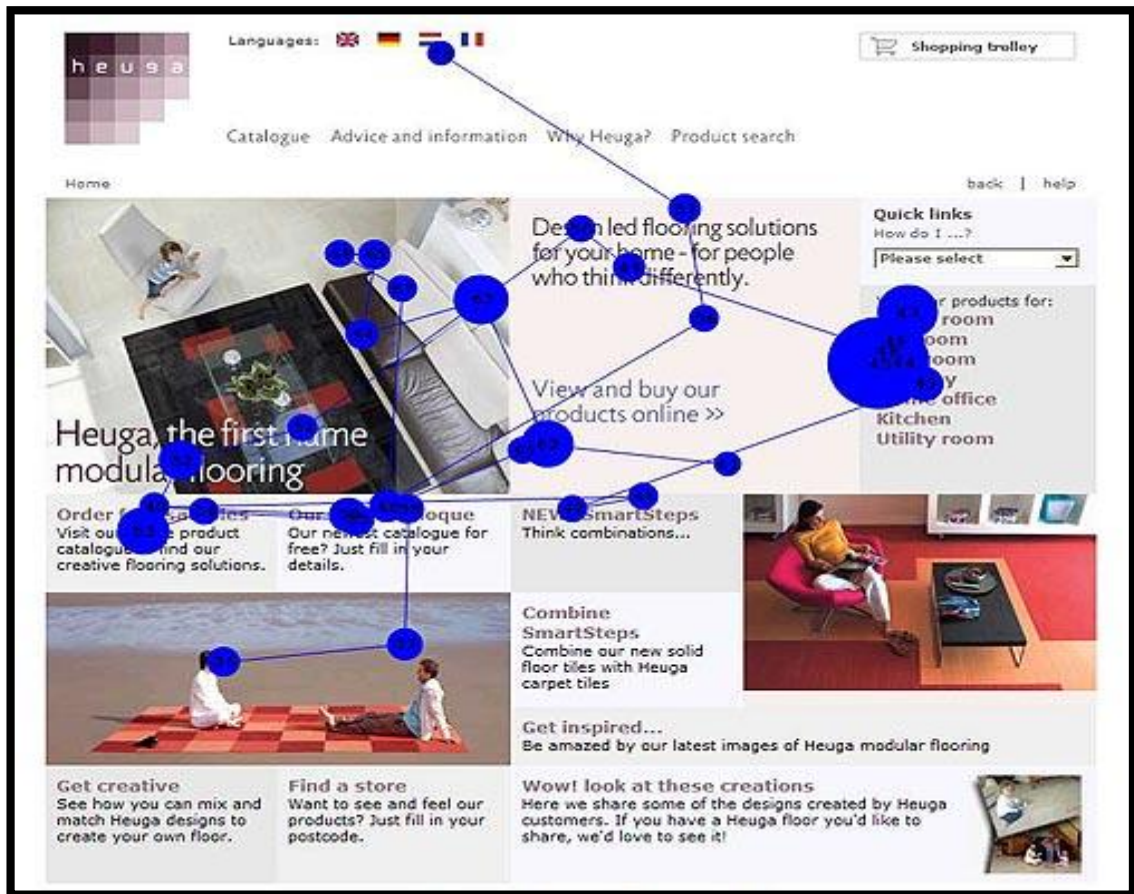


Figure 11: Eye tracking gaze plot. Source:

<http://www.simpleusability.com/services/usability/eye-tracking/gaze-plot>

Fold

Fold derives for the website what is visible without scrolling and the other down part when while scrolling. Practically fold means the conceptual line that separate them. Most commonly fold is considered as 570 pixels from the top margin of the page. Of course, its totally depends on the size of the monitor. But that is more commonly visible for 1024×768 size resolution.

Not surprisingly, in the early age of web design, users were not pretend to scroll at all. Users just simply look at the visible page content and moved away or move to other pages. During the year 1994-1996, in some usability studies it has been found sites often failed to stay user on the site if they are not manged to put the key information in the fold. Long pages are never attracts user. Page scrolling seems an extra work for user and they reluctant to read long passage. The below chart describes user intention over folding webpages that were 100 pixels tall. The chart is made by usability

researcher Jakob Neilson. The chart shows the percentage of viewing time over pixel rate.

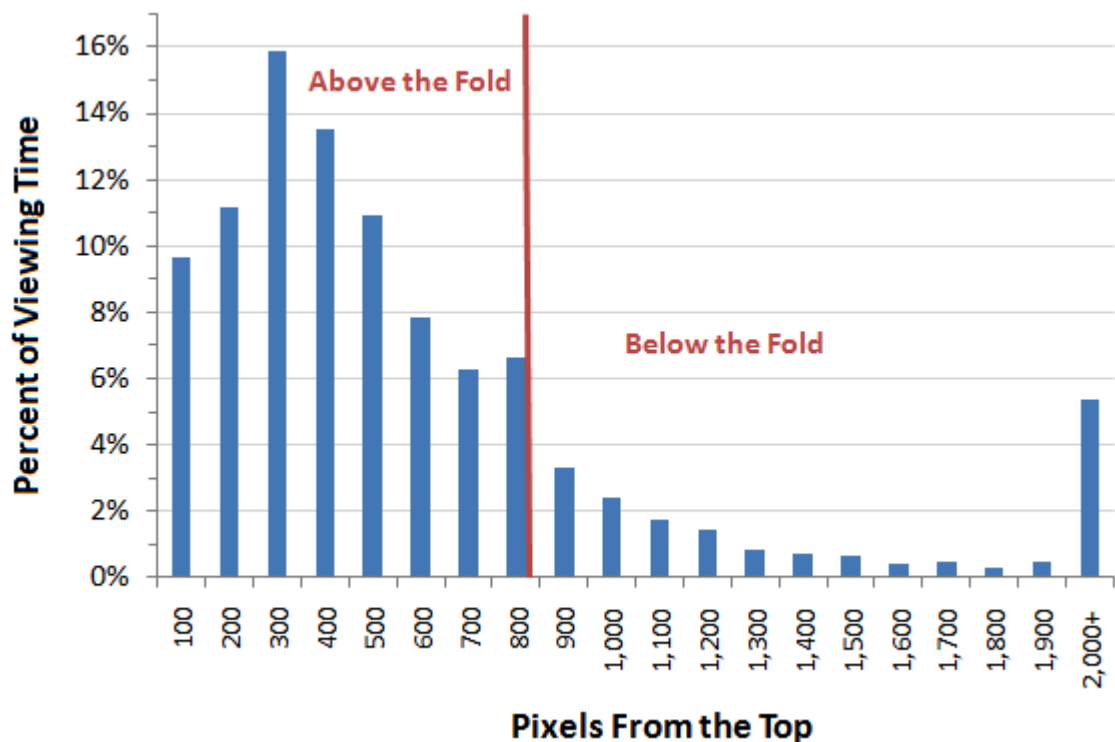


Figure 12: Viewing time over/below fold.

Source: <http://www.useit.com/alertbox/scrolling-attention.html>

However, the image clearly shows that users concentration is mostly attracted above the fold level and mostly in the centre or 300-400 px . The research found that 80.3% viewing time is spent above the fold, whereas 19.7% below the fold (AGconsult 2009).

Foveal viewport

Fovea, is the part of our human eye, which controls for sharp central vision. Eyes mostly use for visual work, like reading, watching, driving, drawing etc. fovea is responsible to operate to do so. Fovea has a very short range or area to observe things, and brain can only collect information from the visible area, that is fovea. In web designing, fovea is important cause the content should be placed in the area to deliver the most important message of your visitors (constaan 2010).

4.7 Usability Best Practises

While designing a website the first thing to concern is “visitor”/”usability”. The reason behind is that the website should be confirmed user interest and needs. So it must be taken carefully that the visitors will find their way through complex site architecture. Here are some Practises on usability.

7±2 rules

Human brain has some limits on its capacity for processing information. It works with complex information into some units or pieces. George A. Miller, a psychological writer, approved that human memory can retain only about 5-9 things at one time. In practise, many websites are supposed to create only 7 menus to deal with our human processing power limitation. In his studies the rule basically seems like 7 ± 2 (Kalbach 2002).

2-second rule

The shorter the response time, the better the user experience. Usability study should concern the time of response. It is estimated that it should response user query or any other application performance within 2- seconds. Page launch, application launch, data query, update information, refreshing the page, should be done within 2-soconds after the execution (usabilityfirst 2012).

3-click rule

Ux-desin also should confirm the set of 3-click rule. Most users are impatient to use the site while they can not get the information or service from the site after three mouse click. Most the rule implies to emphasize the importance of clear navigation, logical structure and easy-to-follow web links hiererchy. It should be clear where the user are and where they are heading for. The point is, yes, it is said that 3-click rule can be applied in most cases with user experience in denying a service or website, but if the site design is comprehensive enough to follow and logically user friendly than of course 3-click principle might not work in some circumstances. However, unfortunately it stands for old people and new net user(One stop web site shop 2012).

80/20 rule

20% causes are done for 80% of the effects. It is a principle which is called “the pareto principle”. The rule is stands in business as "80% of your sales come from 20% of your clients". This idea also can be applied in web design . Dramatic improvements can often be achieved by identifying the 20% of users, customers, activities, products or processes that account for the 80% of contribution to profit and maximizing the attention applied to them (Towers 2010).

8-rules (The golden rules for webdesign)

Ben Shneiderman, Scientist of human computer interaction, from University of Meriland proposed a 8 webdesign rules in designing websites after his research in the laboratory at College park.As a result of Interface Design Studies, Ben Shneiderman proposed a collection of principles that are derived heuristically from experience and applicable in most interactive systems. These principles are common for user interface design, and as such also for web design (Johnson 2010).

- 1) Strive for consistency.
- 2) Enable frequent users to use shortcuts.
- 3) Offer informative feedback.
- 4) Design dialog to yield closure.
- 5) Offer simple error handling.
- 6) Permit easy reversal of actions.
- 7) Provide the sense of control.
- 8) Reduce short-term memory load.

Fitts' Law

- It applies only to movement in a single dimension and not to movement in two dimensions .
- It describes simple motor response of, say, the human hand, failing to account for software acceleration usually implemented for a mouse cursor;
- It describes untrained movements, not movements that are executed after months or years of practice

- If, as generally claimed, the law does hold true for pointing with the mouse, some consequences for user interface:
- Buttons and other GUI controls should be a reasonable size; it is relatively difficult to click on small ones.
- Edges and corners of the computer monitor (e.g., the location of the Start button in Microsoft Windows and the menus and Dock of Mac OS X) are particularly easy to acquire with a mouse, touchpad or trackball because the pointer remains at the screen edge regardless of how much further the mouse is moved, thus can be considered as having infinite width. This doesn't apply to touchscreens, though.
- Similarly, top-of-screen menus (e.g., Mac OS) are sometimes easier to acquire than top-of-window menus (e.g., Windows OS).
- Pop-up menus can usually be opened faster than pull-down menus, since the user avoids travel: the pop-up appears at the current cursor position.
- Pie menu items typically are selected faster and have a lower error rate than linear menu items, for two reasons: because pie menu items are all the same, small distance from the centre of the menu; and because their wedge-shaped target areas (which usually extend to the edge of the screen) are very large (Wiki).

Inverter pyramid

Inverted pyramid is a method in writing, where the structure is aligned from top to bottom. The article starts with a conclusion, then some major points and it finishes by some key details about the relative information. In web design, inverter pyramid is to optimize the section of the site information by giving the head or the theme of the page information about at the top of the page. Jakob Nielsen, an user experience design writer, has been suggested that inverter pyramid style is better for web writing and effective user experience (Lidwell, Holden & Butler 2010).



Figure 13: Inverted pyramid.

Source: http://en.wikipedia.org/wiki/Inverted_pyramid

Wireframe

A skeleton frame of the website, describes the content structure and location in the page. Wireframes are good to describe the design in advance to understand the basic functionality and contents in it. However, wireframes doesnot make any complete design of the site. Its provides just the concept design of the site.

The most common reasons to create a wireframe is to understand:

- how the layout will look like
- functionalities in the webpage
- the effect of different design for different circumstances
- navigational understanding
- confirming the priorities in information and functions
- the layout of the logical functionality

There are many wireframe used to create skeleton for website design. Some reamarkables could be : Mockingbird, Cacao, Lumzy, Pencil Project, Pidoco, Microsoft Visio, ForeUI , Mockflow (wiki 2012; Mashable 2010).

User-centered design

User-centered design is a way for iterative development of webdesign where user experiece is being taken into action to fulfill the user needs. It is made by contacting directly with the end users to get the clear requirements.ISO (International Organization for Standardization)13407 outlines four essential activities in a user-centered design project:

Requirements gathering - Understanding and specifying the context of use

Requirements specification - Specifying the user and organizational requirements

Design - Producing designs and prototypes

Evaluation - Carrying out user-based assessment of the site

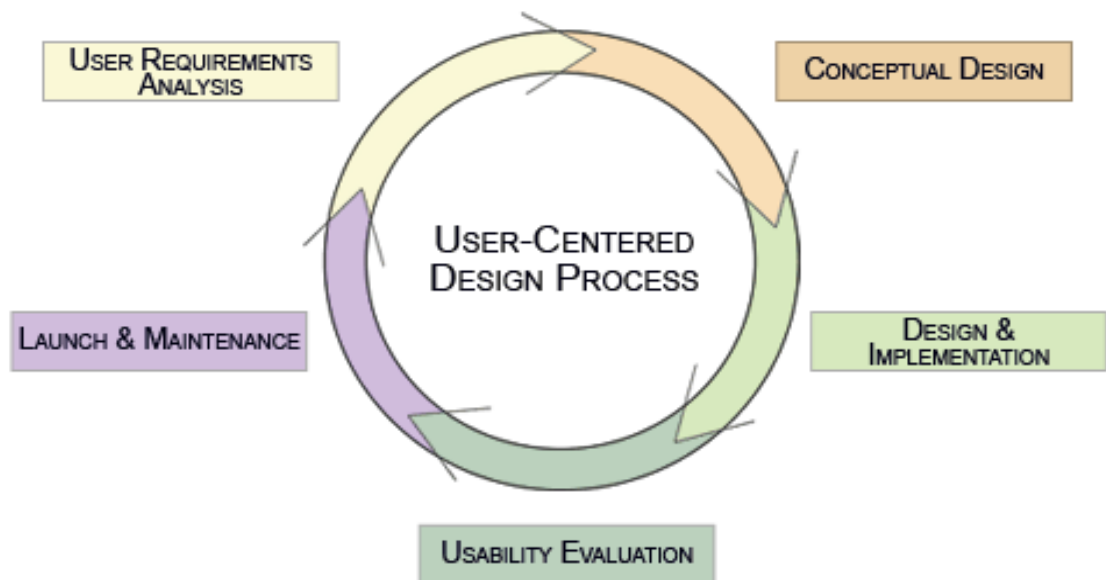


Figure 14: User centered design.

Source: <http://usability.msu.edu/about/philosophy>

Some most popular UCD methods and their use:

Method	Cost	Output	Sample size	When to use
Focus groups	Low	Non-statistical	Low	Requirements gathering
Usability testing	High	Statistical & non-statistical	Low	Design & evaluation
Card Sorting	High	Statistical	High	Design
Participatory design	Low	Non-statistical	Low	Design
Questionnaires	Low	Statistical	High	Requirements gathering & evaluation
Interviews	High	Non-statistical	Low	Requirements gathering & evaluation

Figure 15: UCD methods comparison (Wordpress 2012)

Progressive Enhancement (PE)

Progressive enhancement is a methodology to enhance functionality or modify usability in a more advanced, easy and structured way. It uses layers to identify different features of the created system. The most advantage of the concept is to build or add features to the old system. Mostly this concept concerns the developer side. It also provides a general idea of the site for the site learners through the “developer tool” option for universal users/learners.

The layers can be for example:

First layer : Semantic, HTML. Allows different user agents (text-based, speech-based, robotic) to use the website conveniently.

Second layer: CSS (cascading style sheet). It provides visual effects to the content.

Third layer: javascript : javascript. Allows user agents more superior functionality to the website (Kappert 2011).

4.8 Principles of web design

Screen resolution

While we open a website, the very first thing catch on eyes is layout/the look of the website. While designing screen size is one of key issue that should consider while design for different resolution screen sizes. However, someone might design a website considering only the screen the developer is using for coding. For example, if somebody desing a site with a resolution of 800*600 which will not feet a screen of 1920*1080 (n.t. most of HH computers are using this resolution). The result will be that the website will stand in the center of the screen and all around having a huge empty space. Which might bother user and doesn't consistence in terms of usability.



Figure 15: Screen comparison. Source:

http://boatboat001.com/index.php/blogs/view/behind_the_design_of_this_site

However, the difference between screen resolution size from 320~1920 pixels are of course can be solved. In CSS, min-width and orientation tags are used to solve the problem. And of course the mobile screen should be tested first to confirm the scalability of all other screen resolution (Mak 2011).

Physical consistency

Physical consistency means is to keep the same appearance in all the navigation pages. The navigation look, background color, font, graphical elements, typography, logos, metaphors should be places as it should. It is the first and the most highly important concern for website design to maintain the physical consistencet of the site. Otherwise, the site will be poor, not user centered and complicated to use. In other word, the effectiveness of usability will be lost. Things must should keep in mind:

Avoid Splash Pages: Splash page derives using totally different home page then navigated pages.

Avoid Moving Targets

No content should be moved in any other place just for suitability. NO.

Make Links Obvious

Links and content text should be clearly separated. For example, if underline is used for hyperlinks, then underline should not be used anymore to emphasize any other content element

Use Consistent Styles

Today's technology helps to fulfill consistency a lot. Using CSS or the best option using master page confirms the best way to confirm the layout of the website (Influadd 2012).

Instructions/Feedback on location

Always give instructions to user on the required web pages. CSS hover is the best tool to provide instruction on tags, images, contents, or any other content that needs to be clarified for user.

For example, user quite often get lost by Mystery Meat Navigation (MMN) where a breadcrumb would help to make user instructed. However, breadcrumb is the textual location indicator of the current page (Figure 15):

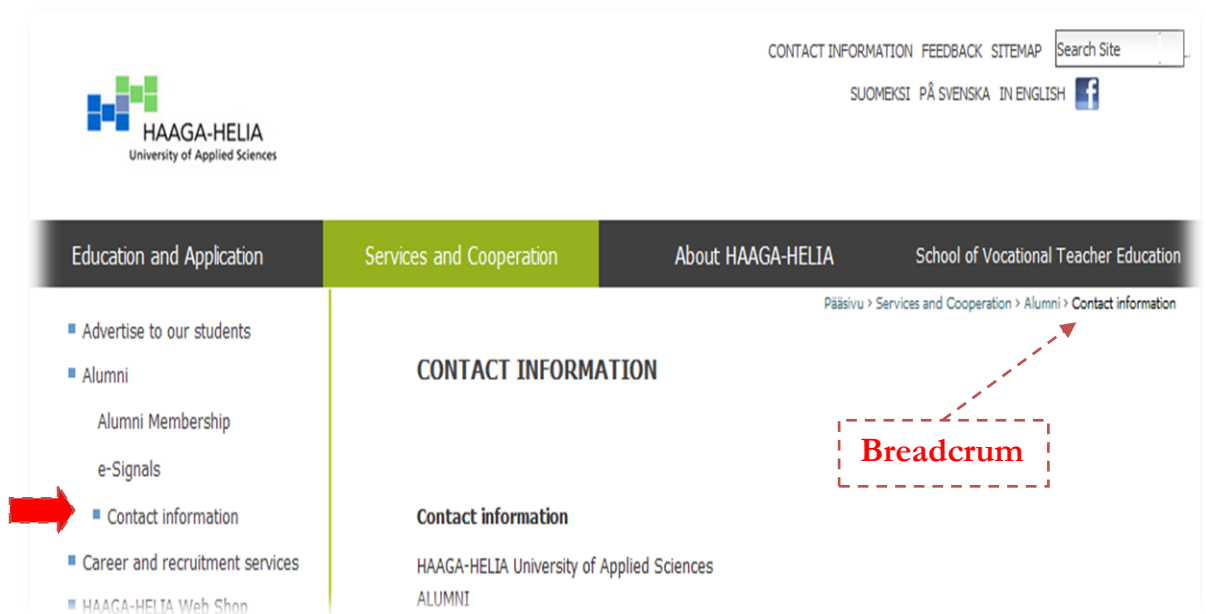


Figure 16: Breadcrumb (HH website).

Multiple options

Usability researcher Steve krug suggested that many user like parallel options for same information. The reason behind is that some user might like text link, some might like graphical links. So to cover all sorts of user giving choices will create the better usability.

Legibility

The visibility and understandibility of text of an website is suits to the user or not ? This is contextual definition of legibility. Legibility is to confirm the text appearance clear and comprehensive, considering the most indivisual reading group of users. The legibility concers, the text size, font color, weight of the font, font group, font x-height, font background, font inheritance,stroke contrast etc. In practise, legibility and readability does not stand for the same explanation. Legibility is moslty indivisual character based concept, whereas readability concers the word, line , paragraph as well as the whole article (Haley 2012). An example:

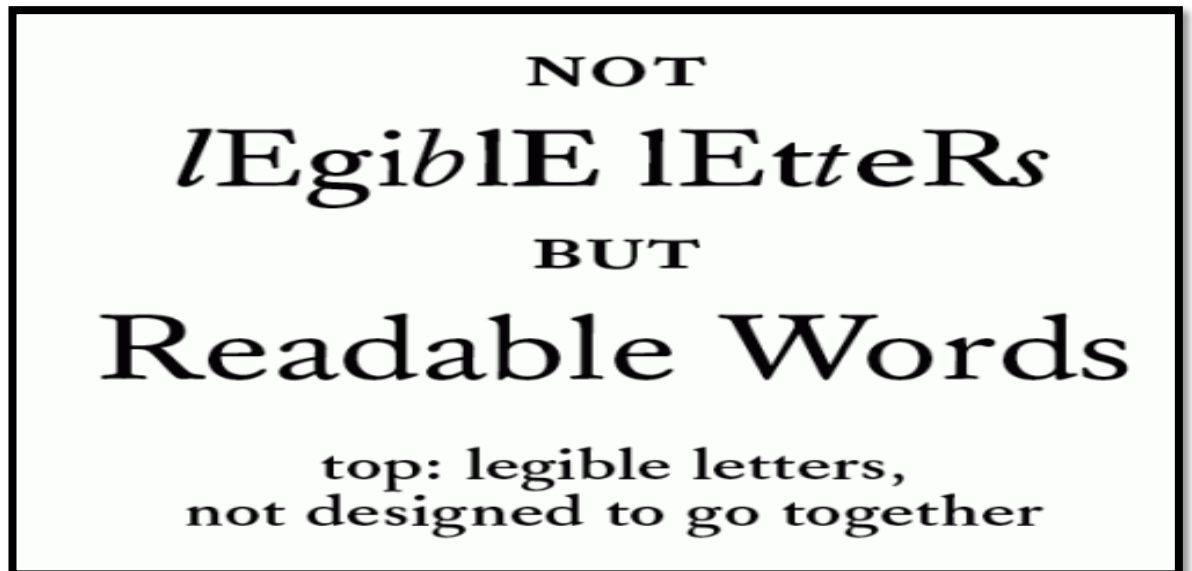


Figure 17: A not Elgible way of typing. Source: <http://www.google.com>

Readability

Readability basically depict the concept of “visible and comprehensive”. Readability consists both legibility and understandability. Font size, font color, typeface, color combination, background, pixels size, word style (underline, bold, italic) are being confirmend through legibility. The structure of the content, word choice, sentence length, grammar structure, comprehensibility of the content is related to the ground of understandability (wiki 2012). Some useful concerns:

- Sentence should be short
- Use familiar words
- Proof read for Grammatical and spelling errors

Font and Typeface

- small font size should not be used. The font size could disturb content visibility in a great extent. Beside this, site that are having target user of all age, should concern about the font size.
- Its good to use familiar and proved typeface; like Arial, Verdana, Times new roman etc.
- Is good to use as much as plain text as possible. And Italic should be avoided for content paragraph.

-Use Cascading Style Sheets (CSS) and JavaScript to dynamically scale font sizes on your Web pages to the user's screen resolution (Thomason 2003).

Use Consistent Language

Same language for the same user. If user choose russian as the site language, the whole website content should show the same language for all the content. No matter back and forth.

Use properGloss

Gloss is an text oriented action that move from page to page in website. Giving proper gloss or short name of the action related page is important. Users want to use system easy, comprehensive and known way, so to follow all the wanted information comfortably.



Figure 18: Gloss word

Color Choices/Contrast

Confirming contrast is a very essential part for readability. While using background color for text font, is highly recommended that users doesn't like a high contrast

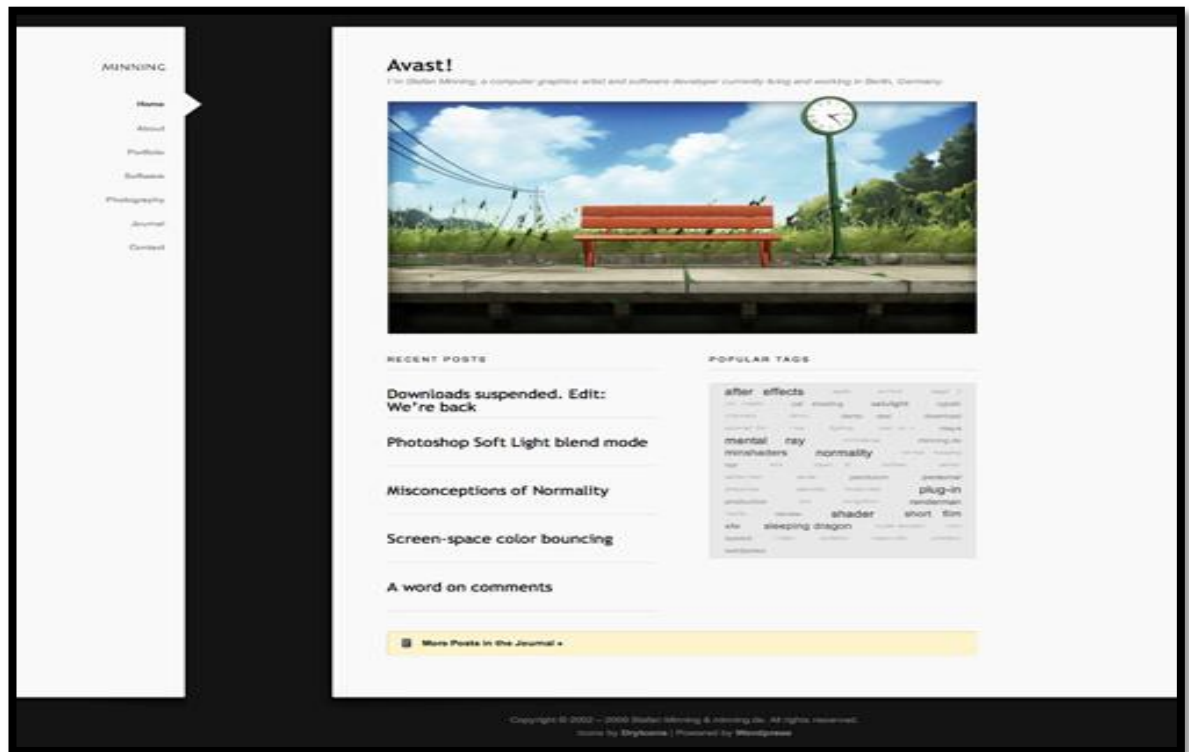


Figure 21: A simple but effective website example.

Source: <http://www.noupe.com/design/simplicity-in-good-web-design-advantages-how-to.html>

Use Graceful Degradation

When a website has system failure or any kind of fault reaction on the site, graceful degradation is the process to confirm the basic components and features available for the site. Even though, some of these links and actions will not be performed because of fault case. The idea of graceful degradation is mostly to display almost all its components during every possible fault scenario and should have tolerancy in configuration in system processes webconnections, browsing, plug-ins, etc. for the site user. As an example, a website might be open in firefox, opera, internet explorer or any older version of that browser, In this case, graceful degradation will help page to be consistent (Tobias, D. R 2012).

Minesweeping techniques

Minesweeping techniques are to make user respond on links or button handler that are active and clickable, which differs it from the rest of the content on the page.

Minesweeping confirms users response to understand the differentiation between the general content and the links/navigation content.

Some common tools/methods that are user to generalize the minesweeping are :

- navigation bar (in most cases, European zone websites provides a horizontal navigation bar to clear the concept of navigate of the site, Western zone navigation is located in the top left of the site)
- hover, bevel, are used to understand link content
- underlines are the most commonly used minesweeping tool for navigation
- image button with gloss identify the linkable content which is mostly use as parent navigation tool (Nielsen 2009).

4.9 Usability evaluation

Usability evautions are mainly divided into three categories. Testing, inquiry and Inspection (Nielsen 1993; Usabilityhome).

Usability testing

Testing methods are the ways to define the website or a prototype where user perform certain amount of task and the evaluation judge and analyze the user prospective about the system or the prototype. Users are usually gives a set of questionnaire, or tasks to perform, and they provide some feedback about performing these tasks or answering the questions. It uses as a feedback for a running or a prototype website. Regarding these user feedback, evalutor analyze all users feedback and come to an end with a appropriate solution. The usability methods are as follows :

- Coaching Method
- Co-discovery Learning
- Performance Measurement
- Question-asking Protocol
- Remote Testing
- Retrospective Testing
- Shadowing Method

- Teaching Method
- Thinking Aloud Protocol

Inspection

Inspection is more advanced area of usability. UX specialist, software developers, or other professionals check or recheck the considerable area of a user interface. The evaluation is more conducive as it is mostly been done by usability experts. Most commonly used user interfaces are:

- Cognitive Walkthroughs
- Feature Inspection
- Heuristic Evaluation
- Pluralistic Walkthrough
- Perspective-based Inspection

Inquiry

The most easy way to get user feedback is inquiry. Users own expectation, needs, improvements can be known by straight talking to them in person. Most often, inquiry is being done verbally or in written form.

Inquiry methods include:

- Field Observation
- Focus Groups
- Interviews
- Logging Actual Use

5 Usability reaseach

5.1 Resaearch method

The research is conducted with Haaga-Helia students. As the usability testing methods, field observation and interviews were being done to collect data. The questionnaire (Attachment 1) is being used to testify the Haaga-Helia website usability against my thesis usability theories.

Field observation is the research method to involves a range of well-defined, mostly unstructured approach to conduct an inquiry. The name of the method also known as the term ethnographic observation, which can be interpreted as "watching people." Informal interviews, direct observation, participation in the life of the group, collective discussions, analyses of personal documents produced within the group, self-analysis, results from activities undertaken off or online are the part of the whole process. In this method researcher use time at the field site effectively. Field observations involved a close eye on how user use the prototype of the system in their adequate ways. However, Observing user in the field is always the best way to determine their usability (patrick).

Field observation required certain artifacts like:

- A notebook and a pen
- Questions could be structured/unstructured but objective
- Jotting down anything that interesting
- Doesn't jump to a conclusions straight away
- Look for more evidence
- Ask people to confirm things
- Need to make user "Think Aloud"

Interview is the second method used for the research. It is a method for discovering facts and judgements compiled by potential users of a system or website being tested. this is a one to one observation to collect data.

Interview is the method for discovering facts and opinions held by potential users of the system being designed. It is usually done by one interviewer speaking to one informant at a time. Reports of interviews have to be carefully analysed and targeted to ensure they make their impact. Otherwise the effort is wasted. Interview methodology success depends more on the pre-process. The questionnaire should justify before the interview to make the best result of the observation.

5.2 Focus group

The focus group for the research was divided into two major part: IT oriented students (Bite/Tiko) and all other students as a general end user. The idea of division is to see the logical viewpoint from the knowledge of IT skilled student and to acquire technical solution from them. However, all other non_IT oriented student are taken as a general user of the website, considering a normal user skill on website. Though, the limitaion on skill varies , anyway, to generalize the usability, it is defined to be a good approach to justify user and usability from different scale of user.

5.3 Research question

The research scope is to testify Haaga-Helia Website usability againt my thesis theory. The research will check the four key facts of the website: Satisfaction, Learnability ,Memorability, Efficiency. And the thesis guidline will be considered as the standard to check the facts.

5.4 Result

In the research, 62 Haaga-Helia students have been taken part to collect data. Among all, 28 IT oriented students and 34 other study group student were participated. Students from 17 different countries of various numbers were being entitled in the research. The countries are: Finland, Bangladesh, China, India, Spain, German, Etheopia, The U.S.A, Russia, Venezuela, Tanzania, Indonesia, Italy, Nicaragua, latvia, Bulgaria, Lithunia. See research findings (Attachment 2.)

5.5 Result Analysis

5.5.1 Visiting rate

HH website visiting rate is quite high. Among the 62 participants 42 user visit at least once a day and not surprisingly, 23 out of 28 student of IT' section visits the website everyday. However, 17 out of 62 student may visit once a day and 3 out of 62 doesn't know their visiting. Thus, almost 62% of surveyed people visit everyday and 28% may be once in a week (Figure 22).

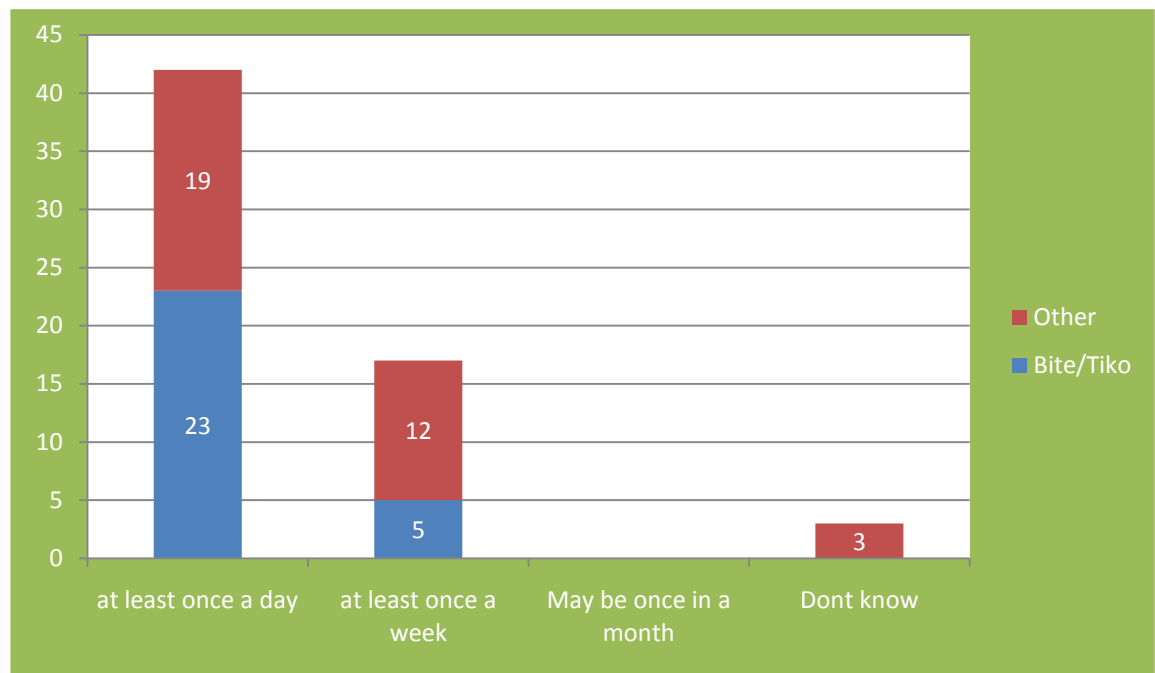


Figure 22: Visiting rate of HH Website

5.5.2 Physical consistency

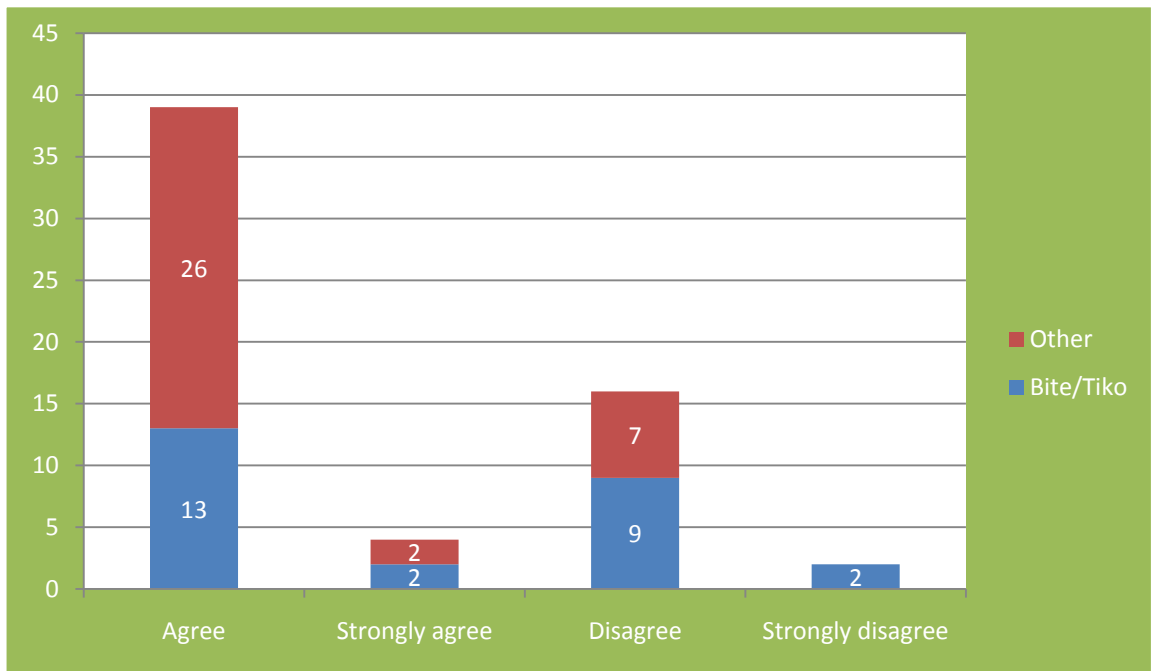
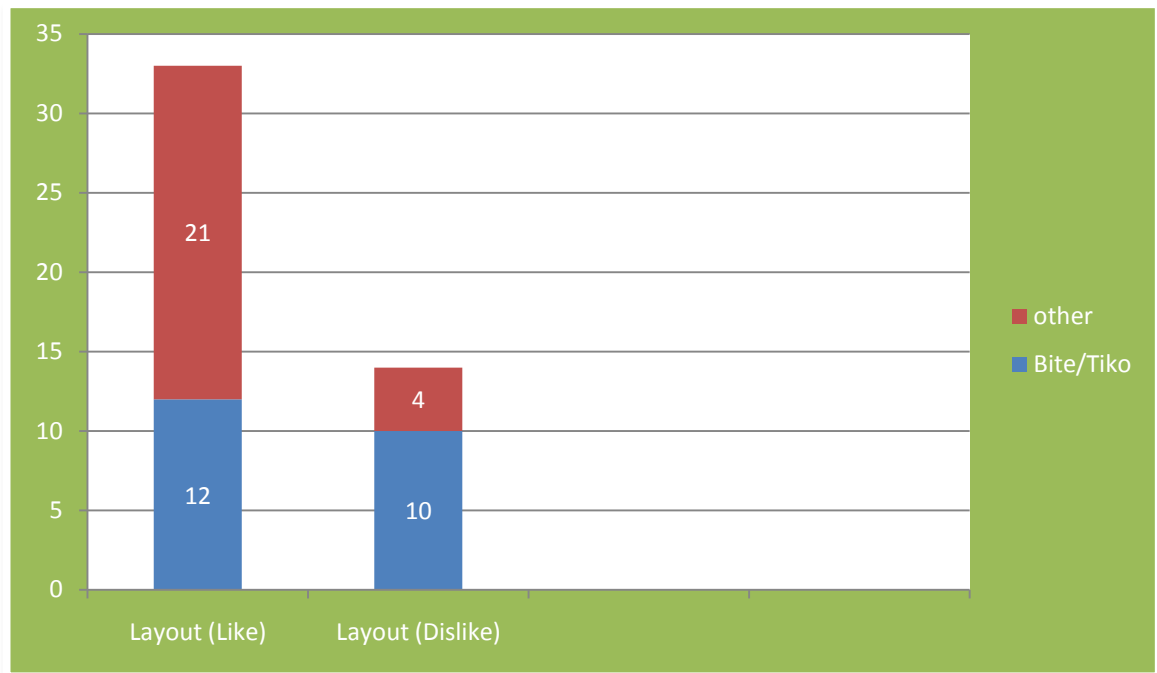


Figure 23: User respond on layout

69 % of the surveyed user agree that the website is consistent and easy to follow, where 6% totally agree with the statement. However, most of the users's perspective is that the site layout is consistent and the content layout is comprehensive. Though ever, among all, 31% feel that its not consistent and they think it's needs to change. Now, according to the theory a consistent website should have the logo, navigation, links, content in the same place alike all other pages. So according to the research result and theory guidline it can be said that the website is consistent and easy to follow cause of the usability confirmation. However, 52% user add it in their like list where 23% of all don't like it (Figure 23).



First page

Among the 62 participants 25 added the first page as their like list. On the contrary, 8 users don't like the first page (Figure 24). However, the website represents no splash page, follows 3 click rules, no moving targets is used, and also have followed the 2-second rule, even 7 ± 2 rules also followed which could provide enough evidence that the site confirms the usability in the first page. Eventhough, because of the shortcuts some user dislike and proposed to change it.

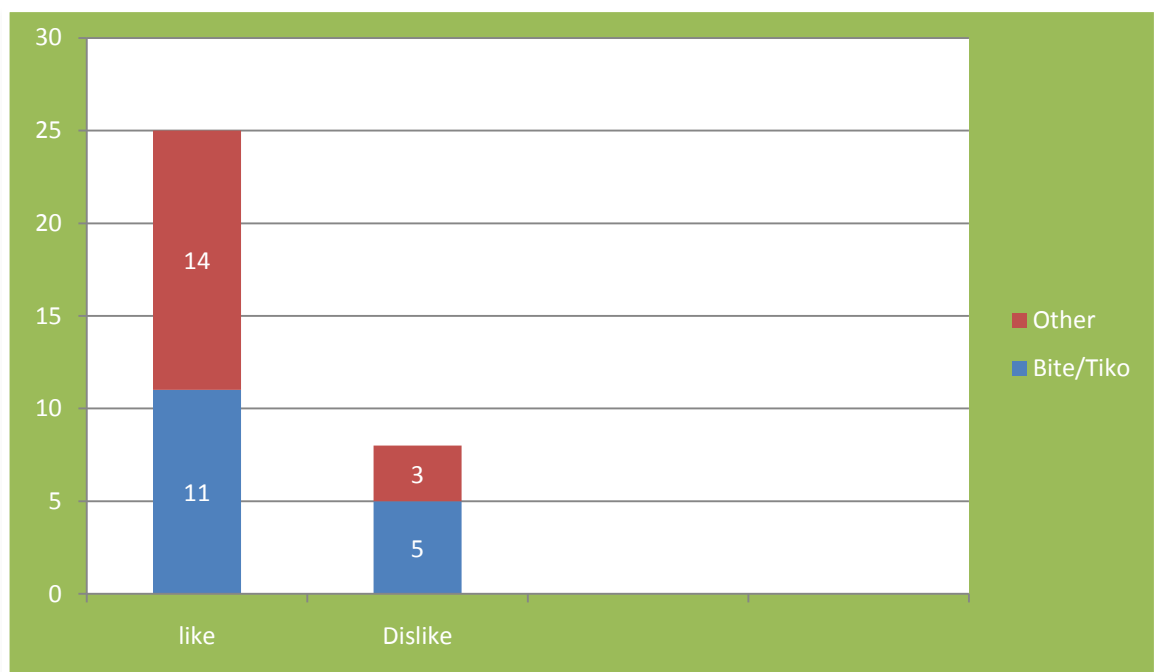


Figure 24: Userprospective about the first page

Background color

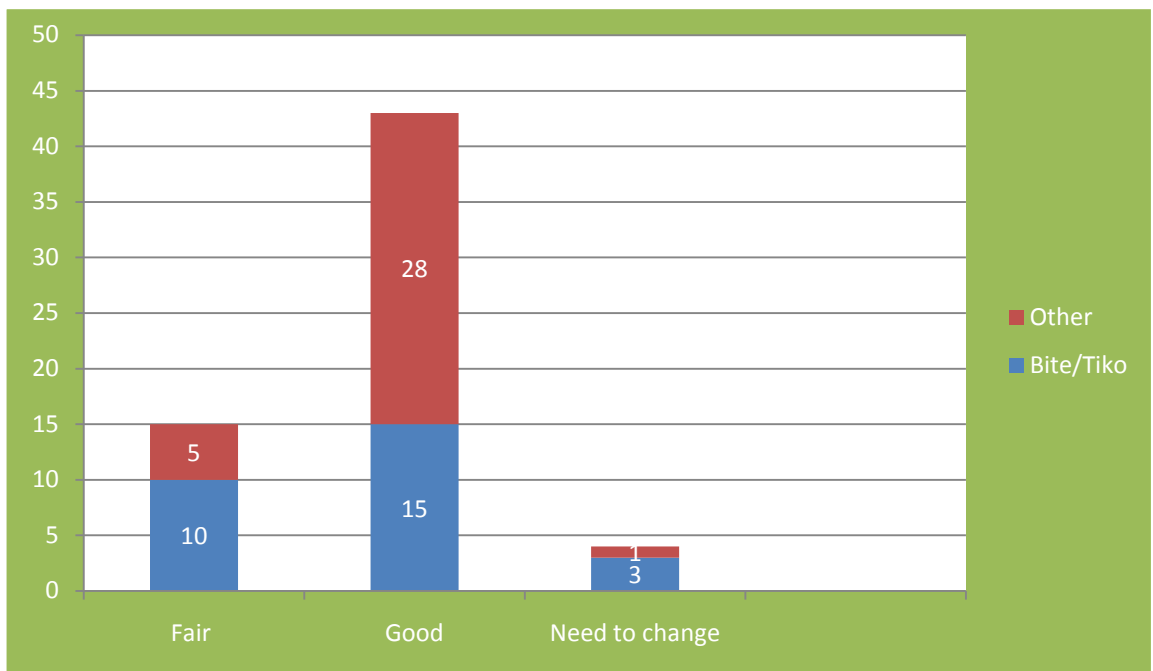


Figure 25: Participant response on background color

Figure : user prospective on background color

Among all, 69% of the user carries a positive aspect towards the background color and 24% think its ok. On the other hand, 3% of surveyed user think the background need to change (Figure 25). However, in the field observation, it has been understood that the site content is clearly visible because of the white background color. Some interviewed user totally agree that the site has a good background color. However, in the book “don’t make me think” propose more white space and simplicity in the wesite, it is obvious the site is confirmed the usabliliy about the background color. However, only 16% people disliked it (Figure 26).

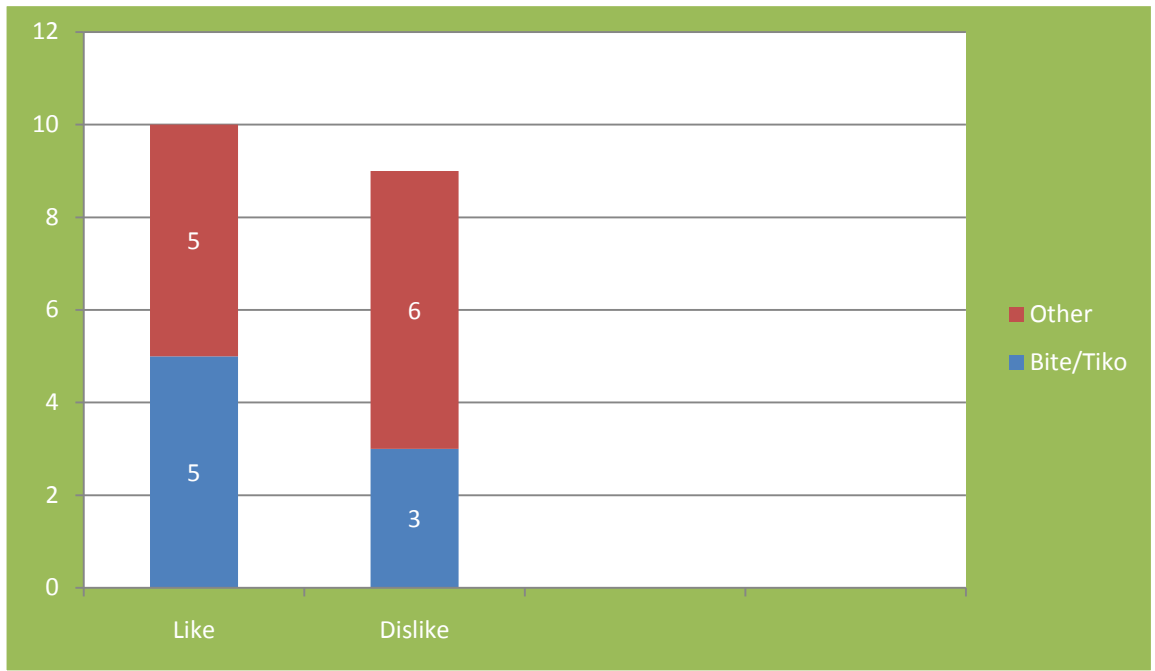


Figure 26:User like and dislike amount on white space (background color)

5.5.3 Navigation

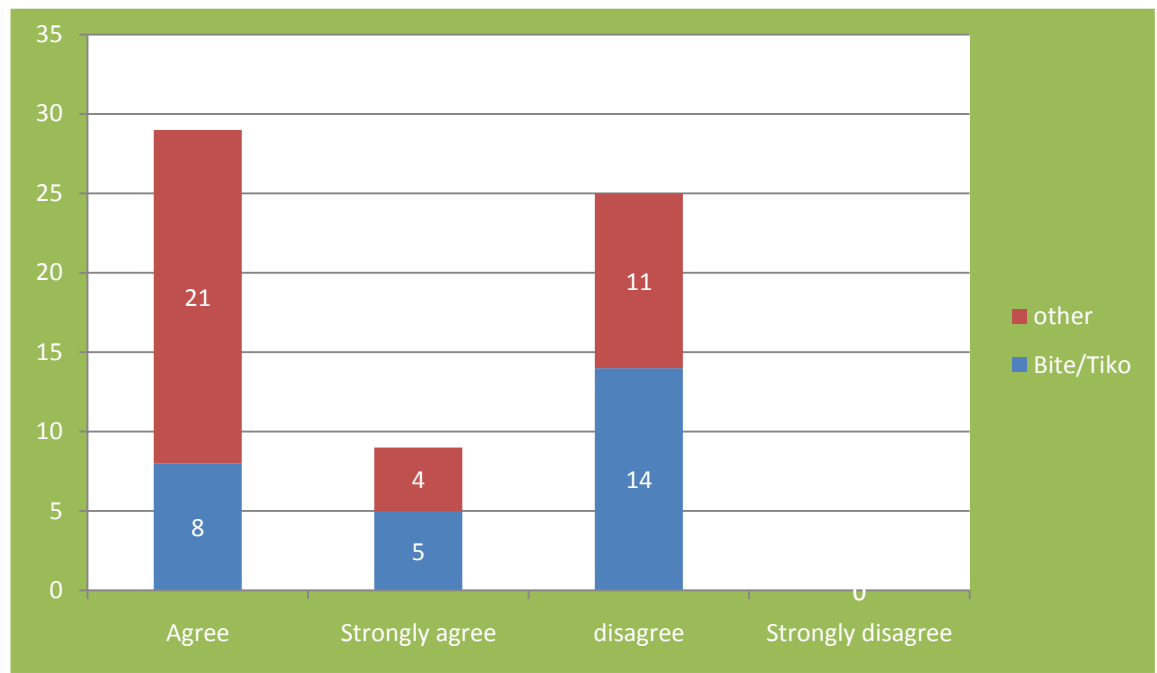


Figure 27: Navigation understability

In the theory, it has been proposed the site navigation should have a proper gloss word and also should confirm the 7 ± 2 rules in the navigation. Users were asked in the questionnaire about navigation “does it clearly stated”. However, 62 % agree with the

statement where 15% strongly agree with it and in contrast, 40% does not agree with it. And the proportion is almost equal in terms of the likeliness of the site navigation bar(Figure 28). In addition, most of the user like the shortcut option as navigation (Figure 28).

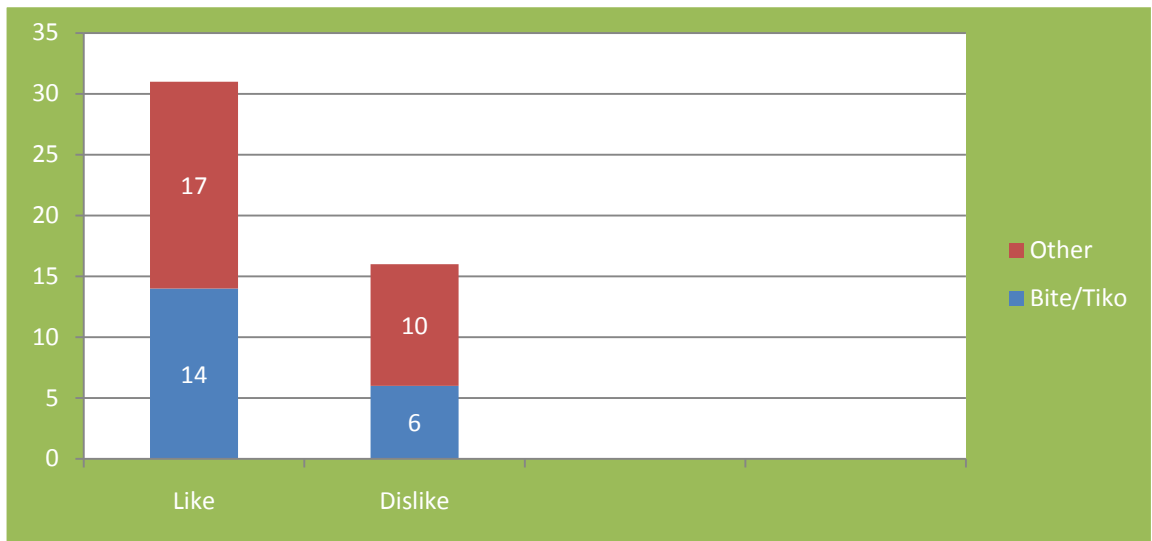


Figure 28:: User like and dislike amount on navigation bar

5.5.4 Site structure

54% people agreed that the site layout is easy to remember and the rest 46% user disagree with the statement (Figure 29). Some user had an opinion that it is really complicated to remember the site structure and mostly they feel that they get lost using some system in the site. However, steve krug said in his book “Don’t make me think”, website should have a site map and should use breadcrum to not to make user think where they are in the website. Thoughever, HH website used breadrum in the site but does not have a site map. In addition, some Bite student also proposed that it could be effective to have site map in the first page.

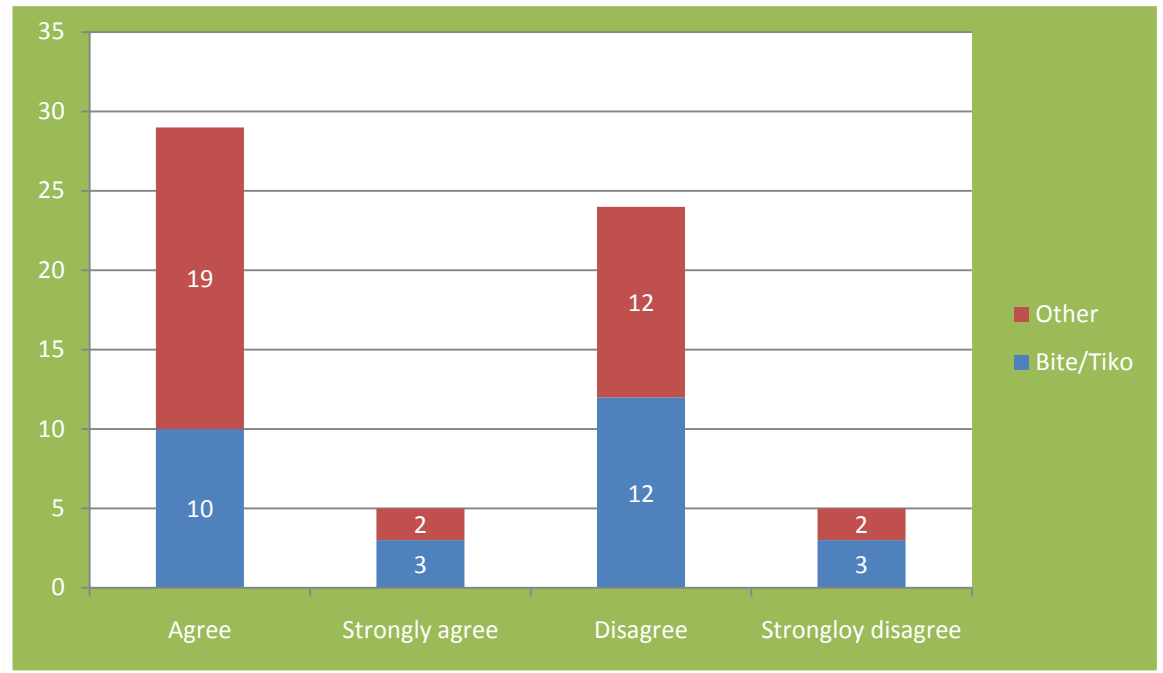


Figure 29: User feedback on site structure

5.5.5 Search engine

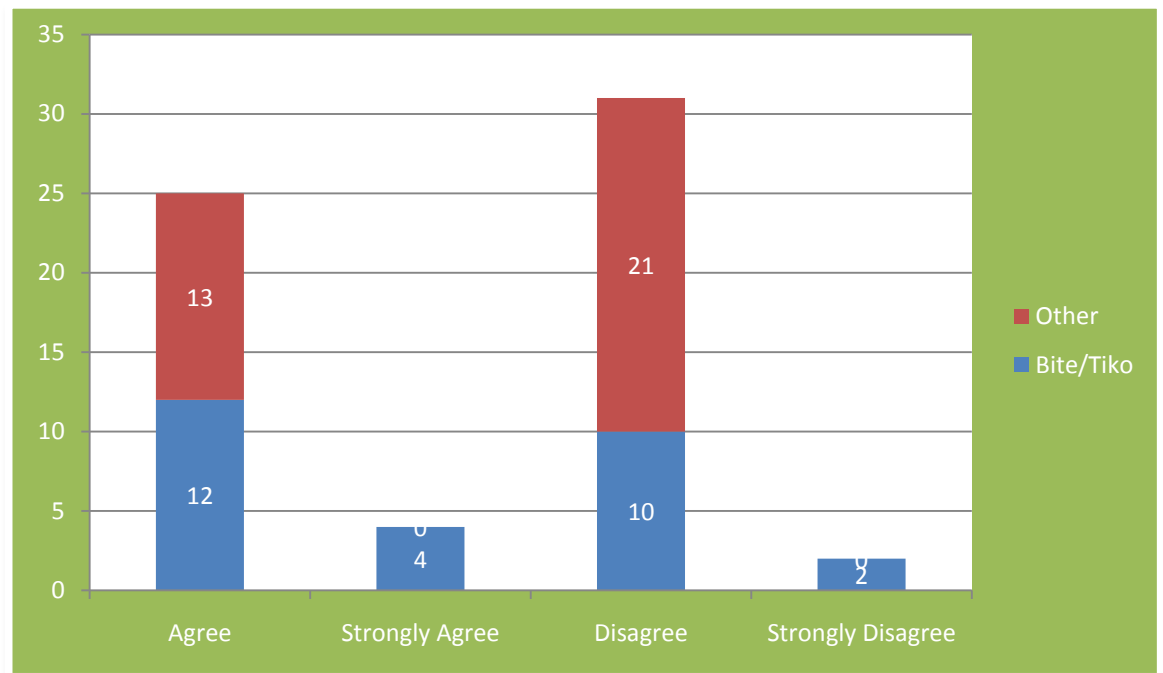


Figure 30: User prospective on search engine

User were asked about the search engine and the availability of the information they looking for. However, this is the most contradictory part in the website. 54% users

found its not effective whereas 46% user think it is (Figure 30). In the interview, some tiko student were asked about the search engine and it reveals that the site search engine gave better response on finnish language than english. In addition, even in finish language search, the response have multiple result of that same query. Accrording to 80/20 rules, it is a bad effect cause if the user doesn't find what they looking for the usability is effecting poorly to the end user.

5.5.6 Legibility and Readability

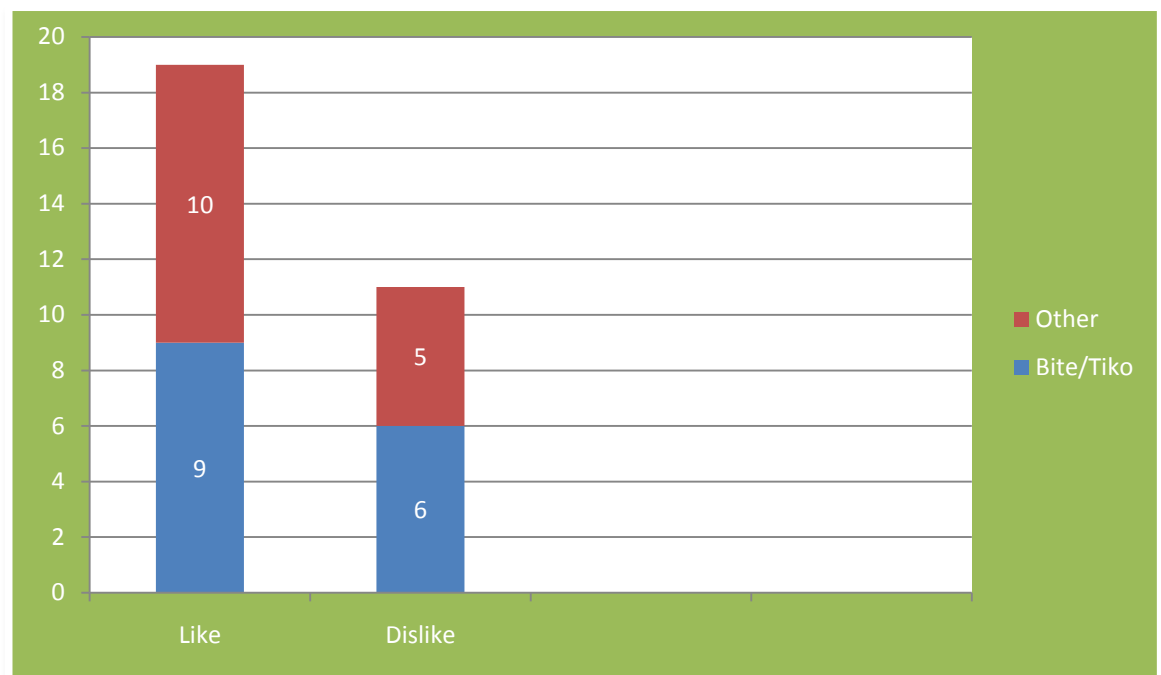


Figure 31: User like and dislike amount on font style

Among the people added font style in their like or dislike list, 63% liked it and the rest 37% think it's not (Figure 31). H-H website used "Tahoma" font style that is most commonly easy to see to the students. Eventhough, in some pages different font style is being used. Like *front page* have "tahoma" font style whereas *Pääsivu > Education and Application > Bachelor Degree Programmes > Information Technology* page has "calibri" font style. That is one of the point the website loss credits, cause to have a consistent website you should have same layout, logos, font, background color, menu, etc. However, the page use plain text what is a good usability confirmation. In the questionnaire user were also asked about the text font "is it easy to read the page content". Among the participants 60% of all thinks it is easy to read, 38% thinks it's ok and only 2% thinks it,s hard to read (Figure 32).

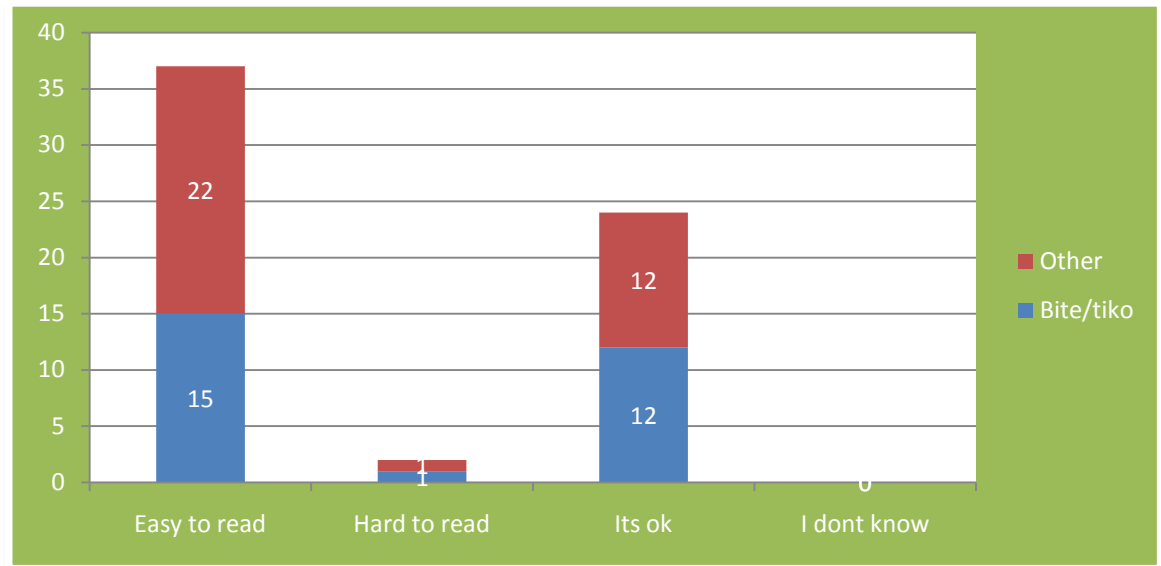


Figure 32: User propective about readability

5.5.7 Page feedback/location identifier

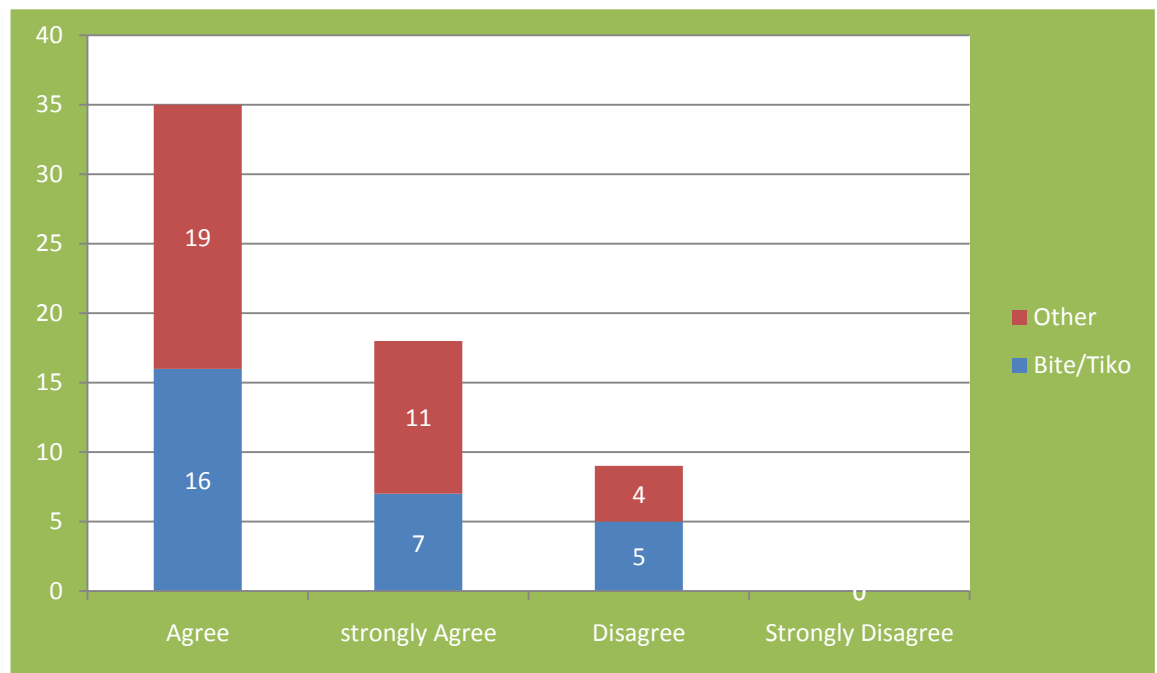


Figure 33: User feedback on page feedback

Users were also asked about the page response time, 85% of users agree with the statement that the page response time is good, where 29% strongly agree with the statement. However, only 15% user think that the page response time is not ok (Figure 33).

In the theory, It has been proposed that page response time should not be over 2 second and should perform the action within 3 clicks. In field observation, using pingdom tool (pingdom.com) to check the page response time, and the result shows it takes 0.6 ms to load the first page.

5.5.8 Rating

The average of page rating is 3.13. In addition, 49% user rated as 3, 33% user rated 4, 16% rated 2 . The website was not being rated as 5 from anybody. Moreover, in the research questionnaire, 1 was representing as very bad, 2 as acceptable, 3 good, 4 as very good and 5 excellent. However, according to user properspective the HH website is considered as a good website.

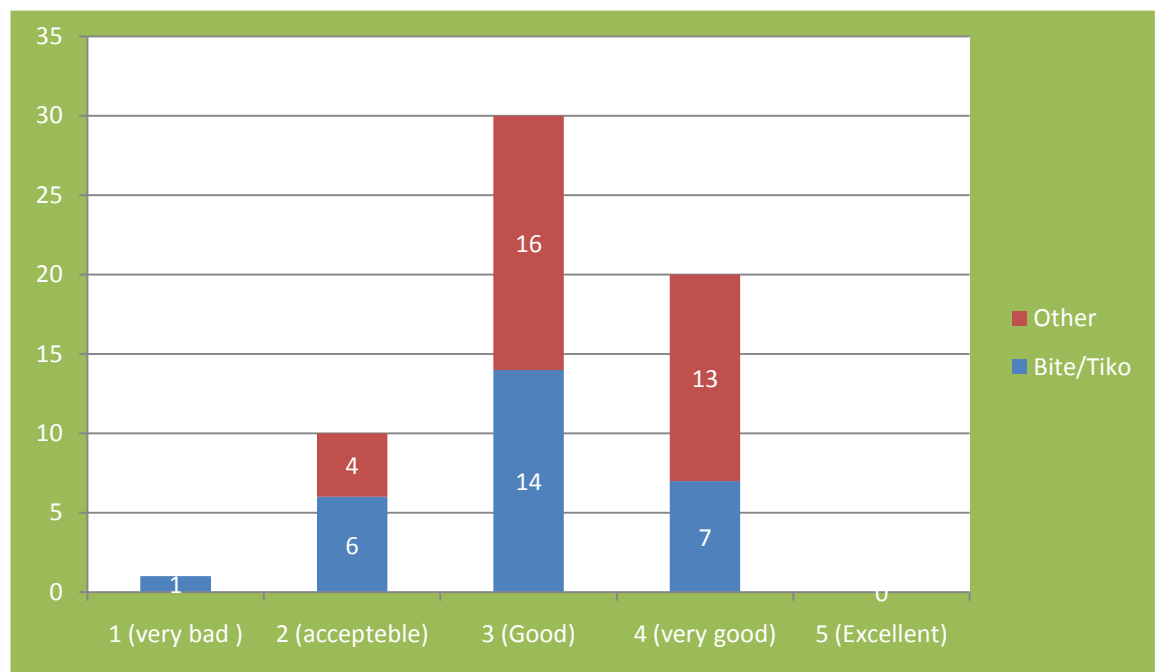


Figure 34: HH website rating

5.5.9 Proposal/Discussion

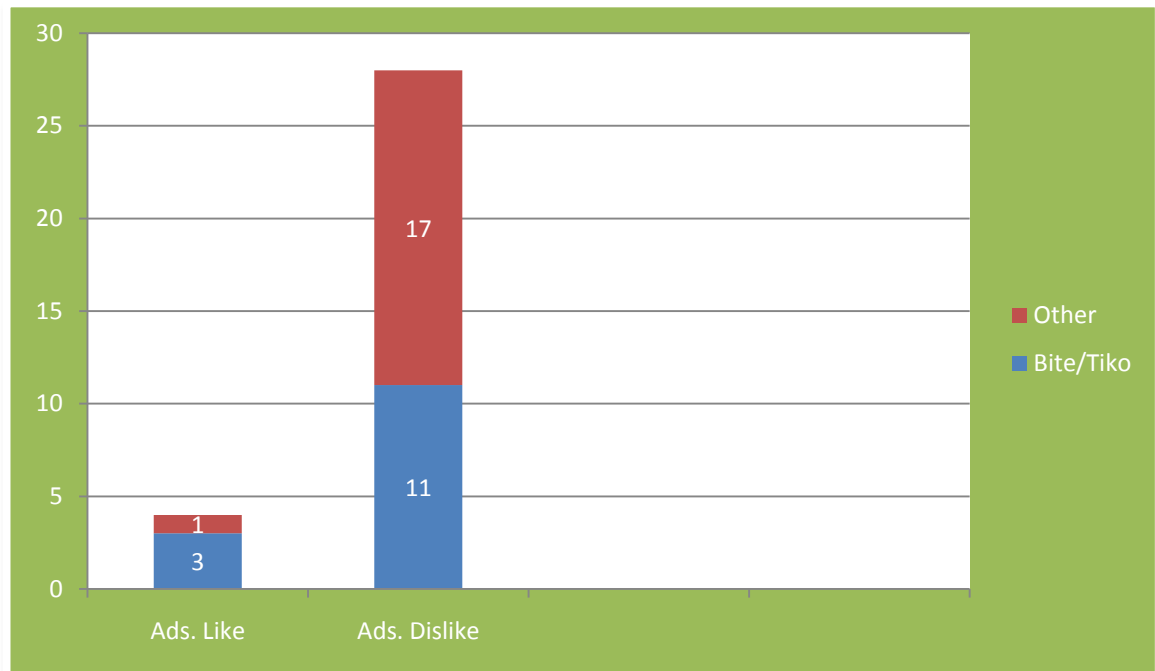


Figure 35: User like and dislike rate on ads.(Advertisement)

After completing the field observation and questionnaire survey, it revealed that some features are should not be in the website. As an example, among the students who replied about ads. in the website, 87% of responded user doesn't like it and they proposed to change it from the first page (Figure 35). After all, there are some proposal from students about the site:

- writing guidelines should obvious in the first page,
- instead of shortcuts there should have visible links in the page,
- english search engine needs to improve a lot,
- Mynet page translation happens automatically after click, though they started with another language,
- Ads. Need to change from the first page.

6 Conclusion

In the latest web world, web technologies are enhancing its scope to confirm technological advancement to the user. Now a days, web design is being concerned more on user experience rather than a flashy, good looking website. Though, somehow new desing technologies are there to motivate user adopting with the latest web world.

Aside adopting with new technologies, it is also important to remember “What user think about the technologies that are being used to build a website?”. In the research, one key point is obvious that user prospective is always towards usability rather than concerning the latest technologies we are using for developing a website. In addition, user satisfaction is more about finding the things easily what they are searching for.

However, most of the participants in this research have a common positive consent about Haaga-Helia Website concerning page layout, first page, background color, font style and size, page response time, location idetifier, legibility, readability, physical consistency, shortcuts, white space etc. On the other side of the coin, there are also dissatisfaction on site structure (memorability), ads, search engine etc.

After observing the data, The four key facts: Satisfaction, Learnability, Memorability, Efficiency could be justified correspondly. Eventhough, user rated the website as good, , however, we could easily say that the dissatisfaction part should be developed so to confirm the four key factors.

Finally, usability is essential to satisfy user to return to the site over again. If user not able to use the site, they will move away. The most effective solution is to confirm usability issues which could create a site accessible and usable for the readers.

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Appendices

Appendix 1: Survey questionnaire

1. Are you studying in **Bite/Tiko**?
 Yes No
2. Please enter your **nationality**?
[Click here to enter text.](#)
3. **How often** do you visit Haaga-Helia Website?
 At least once a day maybe once in a week
 Once in a month I don't know
4. The **layout** is constructive and easy to follow?
 I agree I totally agree I disagree I totally disagree
5. **Is it hard to find** in the website what you looking for?
 I agree I totally agree I disagree I totally disagree
6. How about **navigation**, is it comprehensive and clearly stated?
 I agree I totally agree I disagree I totally disagree
7. Do you think the **page response time** is acceptable?
 I agree I totally agree I disagree I totally disagree
8. H-H website **color scheme** is :
 Fair Good need to change
9. The **Text Font** is
 Easy to read hard to read its ok I don't know
10. Does the site structure (going and coming from different page) is **easy to remember!**
 I agree I totally agree I disagree I totally disagree
11. Was it easy to find the **thesis guideline** for your thesis?

I agree I totally agree I disagree I totally disagree

12. Name **three things you like** the most in the website.

- Layout
- Font style
- Navigation bar
- White space
- First page
- Shortcuts
- Search engine
- News and what's on
- Ads

Anything else in mind (please type):

[Click here to enter text.](#)

13. Name **three things you dislike** in the website.

- Layout
- Font style
- Navigation bar
- White space
- First page
- Shortcuts
- Search engine
- News and what's on
- Ads

Anything else in mind (please type):

[Click here to enter text.](#)

14. How would you **rate HH website** in a scale of 5? (1=very bad ,2=acceptable, 3=good, 4=very good, 5=excellent)

1 2 3 4 5

15. If you are defined to develop HH website, what are the things you would like to change in the website (Bite/Tiko student only).

[Click here to enter text.](#)

Appendix 2: Findings from the research

Data concerning Bite/Tiko student group

Q1.	YES	No
	28	

Q2.	NATIONALITY	
	Finnish	6
	Bangladeshi	1
	Chinese	2
	Indian	1
	Spanish	1
	Israeli	
	German	1
	Etheopian	6
	Nigerian	
	American	1
	Russian	2
	lithunia	
	Venezuela	1
	Tanzania	1
	Indonesia	1
	Italian	2
	Nicaragua	1
	latvia	1

Q3.	ONCE A DAY	ONCE A WEEK	ONCE A MONTH	I DONT KNOW
	23	5		

Q4.	I AGREE	I TOTALLY AGREE	I DISAGREE	I TOTALLY DISAGREE
	13	2	9	2

Q5.	I AGREE	I TOTALLY AGREE	I DISAGREE	I TOTALLY DISAGREE
	12	4	10	2

Q6.	I AGREE	I TOTALLY AGREE	I DISAGREE	I TOTALLY DISAGREE
	8	5	14	

Q7.	I AGREE	I TOTALLY AGREE	I DISAGREE	I TOTALLY DISAGREE
	16	7	5	

Q8.	FAIR	GOOD	NEED TO CHANGE
	10	15	3

Q9.	EASY TO READ	HARD TO READ	ITS OK	I DONT KNOW
	15	1	12	

Q10.	I AGREE	I TOTALLY AGREE	I DISAGREE	I TOTALLY DISAGREE
	10	3	12	3

Q11.	I AGREE	I TOTALLY AGREE	I DISAGREE	I TOTALLY DISAGREE
	8	2	10	8

Q12.	LAYOUT	12
	FONT STYLE	9
	NAVIGATION BAR	6
	WHITE SPACE	5
	FIRST PAGE	11
	SHORTCUTS	14
	SEARCH ENGINE	5
	NEWS AND WHATS ON	7
	Ads	3

q13.	LAYOUT	10
	FONT STYLE	6
	NAVIGATION BAR	11
	WHITE SPACE	7
	FIRST PAGE	5
	SHORTCUTS	6
	SEARCH ENGINE	15
	NEWS AND WHATS ON	6
	Ads	11

q14.	1	2	3	4	5
	1	6	14	7	

Data concerning other students

Q1.	YES	No
		34

Q2.		NATIONALITY
	Finnish	27
	Bangladeshi	
	Chinese	1
	Indian	
	Spanish	
	Israeli	
	German	
	Etheopian	1
	Nigerian	
	American	
	Russian	
	lithunia	1
	Venezuela	1
	Tanzania	
	Indonesia	
	Italian	
	Nicaragua	1
	latvia	

Q3.	ONCE A DAY	ONCE A WEEK	ONCE A MONTH	I DONT KNOW
	19	12		3

Q4.	I AGREE	I TOTALLY AGREE	I DISAGREE	I TOTALLY DISAGREE
	26	2	7	

Q5.	I AGREE	I TOTALLY AGREE	I DISAGREE	I TOTALLY DISAGREE
	13		21	

Q6.	I AGREE	I TOTALLY AGREE	I DISAGREE	I TOTALLY DISAGREE
	21	4	11	

Q7.	I AGREE	I TOTALLY AGREE	I DISAGREE	I TOTALLY DISAGREE
	20	11	4	

Q8.	FAIR	GOOD	NEED TO CHANGE
-----	------	------	----------------

5	28	1
---	----	---

Q9.	EASY TO READ	HARD TO READ	ITS OK	I DONT KNOW
	22	1	12	

Q10.	I AGREE	I TOTALLY AGREE	I DISAGREE	I TOTALLY DISAGREE
	19	2	12	2

Q11.	I AGREE	I TOTALLY AGREE	I DISAGREE	I TOTALLY DISAGREE
	14	2	11	1

Q12.	LAYOUT	21
	FONT STYLE	10
	NAVIGATION BAR	13
	WHITE SPACE	3
	FIRST PAGE	14
	SHORTCUTS	17
	SEARCH ENGINE	5
	NEWS AND WHATS ON	11
	Ads	1

Q13.	LAYOUT	4
	FONT STYLE	5
	NAVIGATION BAR	8
	WHITE SPACE	6
	FIRST PAGE	3
	SHORTCUTS	10
	SEARCH ENGINE	17
	NEWS AND WHATS ON	8
	Ads	17

q14.	1	2	3	4	5
		4	16	13	