

Alexandros Dimas

Optimizing Online Marketing and Implementing e-Business

Helsinki Metropolia University of Applied Sciences

Bachelor of Engineering

Information Technology

Thesis

7 April 2013

Author(s) Title Number of Pages Date	Alexandros Dimas Online Marketing Optimization and e-Business Implementation 37 pages 7 April 2013
Degree	Bachelor of Engineering
Degree Programme	Information Technology
Specialisation option	Programming
Instructor(s)	Neil Smee, Principal Lecturer
<p>The purpose of this project was to design Edutorium.org, a website aiming to serve as an educational source in which the content is added by students. Edutorium.org is designed as an online database solely for the purpose of promoting free online education to those in need of assistance with their studies.</p> <p>The project also dealt with the problem of online marketing and search engine optimization methods online marketing and methods of search engine optimization / methods of online marketing and search engine optimization. Social media optimization is a powerful tool to market and promote a website or online business in its initial stage. The thesis describes the whole process of online marketing from design till launch and shows possible difficulties someone may face and ways to overcome and avoid common mistakes.</p> <p>Edutorium.org was designed with the vision that everyone has a right to education and its future is online. Edutorium.org was designed using the Elgg open source framework and is hosted on a server.</p>	
Keywords	Edutorium.org, Search Engine Optimization, Social Media Optimization, PPC, Search Engine Marketing, Model-View-Controller, Elgg framework

Tekijä Otsikko	Alexandros Dimas Online-markkinointi ja verkkosivun hakukoneoptimointi
Sivumäärä Aika	37 sivua 7.4.2013
Tutkinto	insinööri (AMK)
Koulutusohjelma	tietotekniikka
Suuntautumisvaihtoehto	ohjelmointi
Ohjaaja	yliopettaja Neil Smee
<p>Insinööriyön tavoitteena oli suunnitella ja kehittää Edutorium.org, joka on verkkosivu, jonka tarkoituksena on toimia digitaalisena tiedonlähteenä, johon opiskelijat voivat lisätä kaikenlaista oppimateriaalia. Edutorium.org on suunnattu opiskelumateriaalitietokannaksi, jonka tarkoituksena on edistää ilmaista ja vapaata opiskelua kaikille. Edutorium.org on suunniteltu näkemyksellä, että opiskelun tulevaisuus on verkossa ja kaikilla ihmisillä on oikeus siihen. Edutorium.org on kehitetty käyttäen avoimen lähdekoodin Elgg-ohjelmistokehystä, ja se sijaitsee palvelimella osoitteessa http://www.edutorium.org.</p> <p>Insinööriyön tarkoituksena oli myös tarkastella online-markkinoinnin ja hakukoneoptimoinnin metodeja, joilla voi tehokkaasti kasvattaa verkkosivun vierailijoiden määrää ja parantaa sen näkyvyyttä hakukoneiden tuloksissa. Tutkimus koostuu teoriaosiosta, joka pohjautuu ajankohtaisiin kirjallisiin sekä elektronisiin lähteisiin ja empiirisestä osiosta, jossa esitellään Edutorium.org-verkkosivustossa sovelletut tekniikat. Sosiaalisen median optimointi on tehokas työkalu uuden verkkosivun tai yrityksen näkyvyyden edistämiseen sen julkaisemisen alkuvaiheessa. Insinööriyö kuvaa online-markkinointia verkkosivun suunnittelusta sen julkaisemiseen asti ja osoittaa mahdolliset hankaluudet ja virheet, joita verkkosivun suunnittelija saattaa kohdata sekä ratkaisut niiden ehkäisemiseksi.</p> <p>Insinööriyö tarjoaa yleisnäkemyksen nykyaikaisesta online-markkinoinnista ja sen tulosten avulla voidaan markkinoida ja kehittää edistyksellisempiä ja tehokkaimpia markkinointistrategioita välttämällä monia nykyään tehottomia hakukoneoptimointitekniikoita.</p>	
Avainsanat	edutorium.org, hakukoneoptimointi, sosiaalinen media, hakukonemarkkinointi

Contents

Abbreviations

1	Introduction	1
2	Users' Online Behavior and Website Technologies	2
2.1	Impact of Social Networking on the Modern World	2
2.2	Website Design	3
2.2.1	Planning	4
2.2.2	Designing	4
2.2.3	Programming	4
2.3	Social Networks	5
3	Internet Marketing	8
3.1	The World Wide Web	8
3.2	Keywords	9
3.3	Keyword Optimization	10
3.4	Pay per Click Advertising	12
3.5	Social Media Marketing	13
4	Search Engines and Search Engine Optimization	15
4.1	Morphology of Search Engines	15
4.2	Search Engine Optimization Components	17
4.3	Search Engine Optimization	18
5	Framework Implementation	21
5.1	Elgg Framework	21
5.2	Elgg Data Model	21
5.2.1	Model	22
5.2.2	Controller	23
5.2.3	View	24

6	Edutorium	26
6.1	Synopsis of Edutorium	26
6.2	Structure	27
6.3	Registered Users	29
6.4	Administrators	31
7	Conclusion	33
	References	35

Abbreviations

Elgg framework

An open source, social networking framework.

Search Engine Optimization (SEO)

The process of optimizing a website's parameters in order to obtain higher rating in search engine results and reach more users.

Social Media Optimization (SMO)

The technique used to promote and spread a website's content across social networks.

Crawler

A program used by search engines to discover new websites and the links contained therein.

Model View Controller (MVC)

A pattern used to separate the code into three parts the model; the view and the controller.

Pay Per Click (PPC)

An online advertising model in which the publisher is paid each time an ad is clicked.

Cost Per Mile (CPM)

An online advertising model in which the publisher generates income each time an ad is displayed one thousand times.

1 Introduction

In a rapidly evolving Internet powered world it goes without saying that most of the marketing taking place out there in the social network landscape is a constant competition of who has the most up-to-date information and services, regardless of the business sector. In the case of website marketing the same rules apply, although the challenge for the marketers and website designers is to promote their products to search engines first and individuals second. Edutorium.org is the domain name of the website based cloud service on which this project is based.

This website which is called Edutorium.org is aimed at university and college students and allows its users to upload files and share them with others around the world. It acts as an online educational repository, a cloud for scholastic material enabling the general public to benefit from ones' academic work while granting complete privileges and proprietorship of his content. The selection of this particular project came quite naturally since there was the need for developing and marketing an online business, in this case a website which would be people-centered and above all improve the online educational material availability with a completely modern approach.

In this final year project it is the author's intention to demonstrate methods of marketing a website and properly increasing the visitor count as well as indicate optimization techniques which make the website operate with less errors and penalizations from search engines. The website shown in this project has been designed implementing the PHP based Elgg framework [1]. Elgg framework may not be amongst the most widely used open source frameworks but it provides a core easy to work with, thus giving the developer more time to focus on the search engine optimization and marketing strategy that is applied on this website.

Furthermore, Edutorium.org is designed to be as user friendly as possible, allowing easy access and use to anyone even if they only master basic computer skills and technical vocabulary. At this point it shall be pointed out that the service is not meant to be used only by the target audience but also by professors and teachers since the only requirement is genuine interest for education and original ideas.

2 Users' Online Behavior and Website Technologies

In the present day the Internet has brought innovations and applications which have changed life in countless ways. The web has achieved to become a significant part of people's lives on which they depend for everyday tasks and the whole economic system is deeply interconnected with its various forms and advancements.

2.1 Impact of Social Networking on the Modern World

In recent years the Internet has introduced social networking as the future of communication with it becoming increasingly important and socially acceptable by all ages and genders. Companies use these services to promote and spread information about them worldwide in fractions of a second. Moreover, it has been noted that when for example a natural disaster occurs the news are spread through the social media much faster than any traditional media and that has driven people to adapt this method as well in other parts of their life.

In a very similar way education has become more and more Internet-dependent as universities, schools and educational institutions have come to realize the benefits of e-resources, widely known as online education. The use of this form of education has enormous benefits and unlimited possibilities even in 3rd world countries, as it offers portability and speed, as well as low cost since there is no need for physical presence of an instructor or study material. Widely used e-resources include online encyclopedias and dictionaries such as Wikipedia and dictionary.com. The only negative aspect which is often the determining factor for exclusion from use at schools and universities is that they are not as credible as books and written publications.

In order to properly develop and market a website it first has to be determined what the people's needs are and the way they use the Internet in different parts of their life. Knowing these two things, services which will satisfy their needs can be created and this also gives the ability to introduce new technologies that are going to be absorbed by the potential market chosen to focus on. [2] Any application that is genuinely unique and serves a specific purpose will gain supporters and users as long as the approach is appropriate and where correct methods are used.

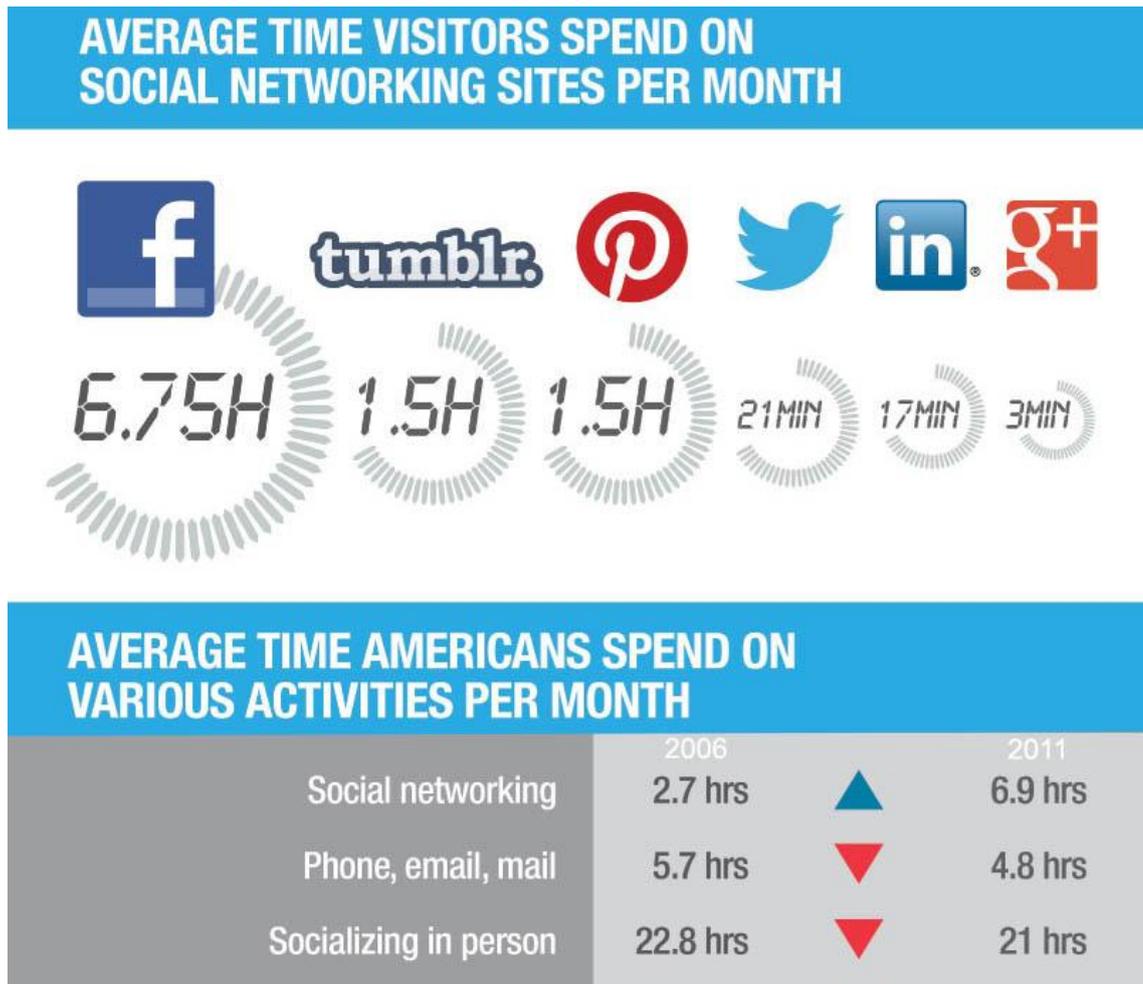


Figure 1. Amount of time spent on online services by the average Internet user. [3]

As indicated in figure 1 the time people spend socializing in person has reduced since 2006 and virtual interaction has overtaken a share of phone and email use.

2.2 Website Design

The term website design describes the part of website creation in which the focus is shifted on how the text, images are videos are projected to the end user. Website design can also be referred to as UI and UX which stand for user interface and user experience respectively. This process can be divided into several parts. It is not enough if a website is aesthetically pleasing, it also has to be designed in way that serves its purpose. For a user that visits a website it is the service that is offered to him

that is most importance. The graphics of a website do improve the overall user experience but priority has to be given to functionality and stability.

2.2.1 Planning

Planning is the first stage of website designing and it is the part in which most of the decisions about the forthcoming project are made. At this point website developers first have to take into account the purpose of the website and the role it is going to serve. It is important to consider whether the website is going to contain only static content such as articles and publications or if it is going to be a social networking website in which users will be creating the content, ergo the programming language used has to be flexible and its main purpose is to serve users' requests. Not allocating enough time for planning can create enormous difficulties later on, which may even set the project back tremendously.

2.2.2 Designing

This is the part in which the website developer has to take into account the user interface, in other words the look and feel of the website as seen from the point of view of the end user. Effortless and speedy navigation while maintaining an aesthetically pleasant layout is the key to successful website designing. The designer has to keep in mind that logical navigation is very important as it resembles what is called a user friendly website and enables the users to find what they are looking for easily.

2.2.3 Programming

Website programming or else known as "coding" is the process of creating problem solving algorithms using different programming languages, in layman's terms it could be called what happens beneath the user interface. Website programming can be divided into two categories; the client-side scripting and the server-side scripting. The first category, client-side scripting refers to the scripts that are executed client-side, on the user's web browser instead of the web server. [4, 5] Server-side scripts on the other hand interact with a server and the operations are performed remotely on that server which sends a response to the client. At this moment the most common client-

side scripting language is JavaScript. There are also other languages including AJAX which is popular for reducing server load and its speed of execution.

Server-side scripting takes place solely on the remote server; therefore, portions of the website are stored in a database and the code can be implemented for all pages with a common structure. This limits the user's access to databases and also enables the owner of the website to limit or reduce the access to the source code which in many cases might be valuable in itself. The most popular server-side scripting language is PHP. Figure 2 below displays how a request from a computer is processed by the server which sends an HTML response back to the web browser. [6]

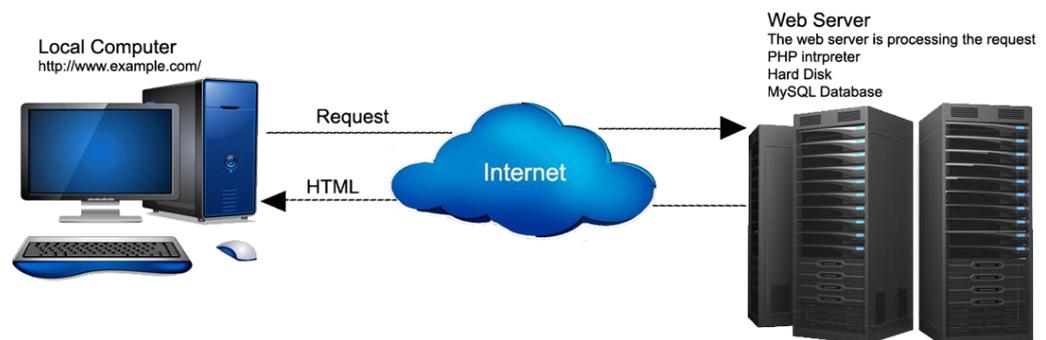


Figure 2. Illustration of server-side scripting [6]

Programming a website using the Elgg framework is really easy since the core is provided and this saves the developer the time of having to reinvent the wheel and start from scratch, instead the framework can be extended and tweaked to fit a specific purpose. Elgg is mostly based on the PHP programming language but JavaScript and AJAX are used extensively in different parts of the website where these are needed or are more appropriate for a specific purpose. The Elgg core is designed to offer an excellent social networking framework and is really flexible and can be modified and turned into just about anything. [7]

2.3 Social Networks

Social networks are websites which from the users' point of view offer a service rather than only web pages. These networks allow users with similar interests and activities to share and connect with each other. Social networks offer users the ability to create

their own profile page which usually contains pictures, or at least, a profile picture of the user and information about them. These users have the ability to make posts on pages of the website or reply and comment on a post made by other users. In general these networks promote information sharing which can differ depending on the niche the website focuses on. The user profile page is developed to make the user feel he has the ability to modify it into a reflection of himself; in other words, he can display everything that is important to him and share it with the online community of that particular network.

The main difference between social networks and online communities is that the first focuses more on individuality whereas the latter on groups. Social networks allow their users to navigate the website and use tools to engage with others using their profile simulating that way real life social interaction. This daily virtual form of socializing has undoubtedly made people re-evaluate the way they meet and connect with others. For the most part these networks only require basic information from the user such as gender, age, name, location and very often niche related details. This information allows the website to form a database of information that makes it possible to search for users using metadata such as skills and education. [2, 10]

Social media is a wider category of services, tools and applications that allow the World Wide Web to be used as a means of social interaction including the social network services. Social media is defined as “a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content”. [12] The applications of social media include blogs, email, instant messaging, and social networks are websites that take advantage of these tools to generate and access content in order to allow users to connect, share and interact.

The advantages of social networks and their applications are numerous for a variety of people, corporations, and institutions. The main benefit for companies is the number and diversity of people who they are able to reach with usually minimal cost. The way information is added and spread through the Web on diverse social networks enables the locating and contacting of people of any nation and discipline. Social networks create the perfect environment for market research considering that a simple poll on Facebook or LinkedIn will give quite an accurate image of the situation.

Numerous companies use social networking services to improve customer service and broadcast news about the company or its products, for example about a software update that is available. As figure 3 illustrates there are numerous social networks and these can be divided into different groups according to their niche and the purpose they serve. [13]



Figure 3. Social Media Landscape. [28]

The social media niches are countless and so are the users who utilise these networks in different ways and for different reasons. People want to create, share and connect no matter where they are and these networks give them that ability.

3 Internet Marketing

Internet marketing can be described as the process of using the World Wide Web as the means of marketing products and services, thus including the marketing of websites themselves as services. Internet marketing is not a procedure of its own but is rather a fusion of different practices including search engine marketing (SEM), search engine optimization (SEO), social media optimization (SMO) and e-mail marketing. Search engine marketing is the practice in which the web marketer improves the visibility of a page and the whole website as a structure through search engine optimization and pay per click advertising.

SEO is closely related but not limited to the term “findability” and describes the ease with which words, pictures, information and resources in general can be found on a website, both outside and inside the page. The liability of a website is also very important since that is one of the key factors along with the quantity and originality of the content that determines search result rankings. [14]

3.1 The World Wide Web

The World Wide Web at the moment of writing is in its second version and it is a system of interlinked hypertext documents accessed via the Internet. The Web is not to be confused with the Internet because the two are different. The Internet is a system of interconnected networks that use the Transmission Control Protocol and Internet Protocol (TCP/IP) whereas the Web resides on these networks making it its subset. The Internet and thereby the Web have seen an incredible growth since the year 2000 when they were in an elementary stage of version 1.0 and the number of users has increased by roughly six times since. At that time the search engine company Google had just started operations, compared to today where it creates the SEO rules.

Even though the Internet has grown it has not spread consistently in every country. Countries that once accounted for the majority of Internet use worldwide are no longer dominant. Those metrics have now equilibrated and a higher number of users can be seen worldwide. To put it another way, the top 10 countries no longer account for over 70% of the total number of users but rather an increase in the overall Internet user number in the rest of the world. Table 1 below includes the top 10 countries by Internet

user count and it comes as no surprise that the number of Internet users in China is proportional to its inhabitants. [15]

No.	Country	Internet Users (Millions)
1	China	513.1
2	United States	245.2
3	India	121.0
4	Japan	101.2
5	Brazil	81.8
6	Germany	67.4
7	Russia	61.5
8	Indonesia	55.0
9	United Kingdom	52.7
10	France	50.3

Table 1. Countries with the most Internet users in the world in 2012. [25]

This increase in Internet users dictates the world is moving to worlds and even more internet oriented era and companies naturally will follow. This also creates a perfect opportunity for marketing and advertising since companies and marketers are no longer limited to promoting services and products in the traditional way and Internet marketing reaches even more people, usually at even lower cost.

3.2 Keywords

Keywords are the key to successfully being found on search engines; in other words, keywords determine a website's "findability" on the Web. Choosing correct keywords, or even better, keywords that are relevant, is the most important factor in the SEO strategy and, therefore, the whole search engine strategy. Words that are specific and highly targeted provide the best results compared to broader non-specific or irrelevant keywords. It is a common phenomenon that many Internet marketers do not succeed in understanding how the average user employs search engines to find content. The keywords used, although relevant to the website's content may be irrelevant to the keywords typed-in by the visitors. A successful use of keywords starts by conceiving the target user's mind-set and using keywords that derive from those words. [9]

Most search engine users want the most relevant results for their need with the least amount of work. For instance a user who needs a new laptop would not type “my laptop just broke, I need a new low cost laptop to replace it” as a search query, instead he would look for something similar to “low budget laptop reviews”. In an advertiser’s mind the relevant words in this case might be “laptop, inexpensive, warranty, high-quality, new” but only one of these words matches the searcher’s query and there are probably hundreds of thousands of results for that exact keyword, and it is highly unlikely that the user is going to pick this specific result. Longer keywords result in lower search volumes but at the same time contribute to a higher conversion rate. [16]

3.3 Keyword Optimization

Because keywords are the key to opening the website to the searcher, they have to be chosen carefully. The wisest approach is to put down a list of words related to the website or business and using some tools to rate how well they rank on search queries.

Among the most powerful and widely used keyword evaluation tools is Google Adwords <https://adwords.google.com/o/KeywordTool>. This tool lets its user discover keywords relevant to words the user enters. A website can also be inserted and choosing a category while applying some filters such as location and language these keywords can be narrowed down to more relevant ones. Google Adwords also provides a bar chart that indicates the approximate monthly searches using a specific keyword query. [17]

KwMap, available at <http://kwmap.net>, is a tool that works in a slightly different manner. Instead of comparing keywords and ranking them, it generates a virtual map of similar keywords that can be used as alternatives. Another technique is searching keywords the competitors of the specific niche are using on their websites. This can be done by visiting each site and analysing their website’s meta tags. Meta tags are located at the top of a page’s source code as shown in listing 1 below. [18]

```
<html xmlns="http://www.w3.org/1999/xhtml"
  xml:lang="en" lang="en">
<head>
```

```

<meta http-equiv="Content-Type" content="text/html;
charset=utf-8"/>
<meta http-equiv="Content-Type" content="Edutorium.:
About"/>
<meta name="description" content="Edutorium is
designed for university and college students and
enables its users to upload documents and share them
with the world."/>
<meta name="Edutorium.org" content="1.8.9"/>
<meta name="keywords" content="education, studies,
college, science, network, assignment, buy, reports,
marketing, psychology, help, sample, university,
university, essays, resources, school, sharing,
online, medicine, chemistry, articles, university
help, university questions, entrance, exams"/>
<meta name="Edutorium.org" content="2012111100"/>
<meta
property="og:image"
content="http://edutorium.org/edutorium_logo.png"/>
<title>Edutorium.: About</title>
<link rel="SHORTCUT ICON"
href="http://www.edutorium.org/_graphics/favicon.ico"/
>
</head>

```

Listing 1. Meta tags

As listing 1 illustrates, all meta tags of a website are accessible to anyone. Therefore, it is simple to find out what key words the competitors are using for their websites. Many claim that keywords nowadays are not as important as they used to be due to the algorithms of the big search engines such as Google and Yahoo! being sophisticated enough to count page content and backlinks more than just keywords, thus reducing chances of falsely or wrongly used keywords in the meta tags of the page. Properly defining keyword phrases and keywords improves page theming, keyword density analysis and the overall page optimization.

3.4 Pay per Click Advertising

Pay per click advertising (PPC), or else known as paid search marketing, uses the sophisticated search engine algorithms and displays a relevant or similar search result. For instance, if a user searches for restaurants, Google displays the normal organic results and also the paid search results at the top or the right of the page. These are also known as sponsored links. Usually people favour organic results but still the number of people who will prefer and click on these advertisements is quite high. Google has its own advertisement segment called AdSense which generates enormous annual revenue. Figure 4 illustrates how Google's organic and paid results are displayed.

The screenshot shows a Google search for "domain names". The search bar at the top contains the text "domain names" and a search button. Below the search bar, it indicates "About 98,900,000 results (0.19 seconds)". The results are divided into two main sections: "Everything" on the left and "The web" below it. The "Everything" section includes filters for Images, Maps, Videos, News, Shopping, and More. The "The web" section includes filters for Sydney NSW, Change location, and Any time. The main content area is split into two columns. The left column contains organic search results (green background) for "Domain Name Registration, Register Australian Domains | Netregistry", "Australia Domain Name Registration Services | .com.au Domains", "Domain Names, Domain Registration & Web Hosting, PlanetDomain", and "Australia .com.au domain names, cheap domain name registration". The right column contains paid search results (pink background) for "\$1 Australia Domain Names - Why pay more?", "Domain Names at Go Daddy", "Cheap Domain Names", "Australian Domain Names", "Domain Names", "Australian Domain Names", "\$7.49 Domain Names", and "Domain Names".

Figure 4. Google's organic and paid search results. [8]

Search results from Google usually have this layout. Paid results (pink colour) are displayed on the right side of the page as well as two to three ads are located on top of the organic results (green colour). These ads are very often location based if the user has shared his location with Google. [8]

Google has created a highly sophisticated mechanism for advertising. Google Adwords allows the users to choose which keywords best represent their business or website according to the keywords they have chosen. When a user searches using a specific term and that matches the keywords that have been preselected by the advertiser, the advertisement shows in the results. This apart from advertising the business also filters the potential customers because when a user searches using a specific term, it is known that he is already interested in that particular niche which significantly reduces the bounce rate. [10]

Investing on Google Adwords however does not guarantee that all traffic gained from paid advertisements is going to convert into sales and profit. It is very likely that bigger companies which invest more in similar keywords will eventually overtake the traffic from Google search results. Another negative prospect is that Google Adwords only covers search results from Google and not any other search engine which on the one hand limits the audience to Google users but on the other hand covers the largest amount of users taking into account that Google serves around 900,000,000 unique users each month leaving the rest of the services far behind. [19]

3.5 Social Media Marketing

An extremely popular Internet marketing practice is social media marketing. Marketing a business in social networks has become more popular in the past few years. The main reasons are it is inexpensive and the audience is already there consisting of hundreds of millions of people from all around the world. For instance Facebook, which is the most popular social network, offers numerous possibilities for marketers. Business pages can be created and the only requirement is an existing account. These pages can be then promoted to friends to like and share which increases coverage and exposure. There is a practice in which marketers can buy “likes” on Facebook but it is not known whether it actually works and it is considered black hat activity; in other words, it violates Facebook and most social networks’ terms of use. [10]

Nevertheless, Facebook offers paid advertisement on a specifically targeted demographic. These advertisements can be really economical if the product is within the Facebook network such as the company’s Facebook page. Facebook also offers cost per mile and cost per click advertisements. The benefit of the latter is that the

marketer only pays for every click whereas in cost per mile (CPM) the payment is by each 1000 impression.

There also exist numerous possibilities of advertising on the Internet even for free. Blogs, forums, other social networks such as Twitter and YouTube can be used to attract users to a website. Commenting on blogs of a similar niche can be a very effective way to get a constant traffic flow to a website. In a similar manner being active on forums and even videos on popular services such as YouTube can be a way to become more well-known using the word of mouth technique. This also creates links to the website from various other domains. Google gives a higher page rank to sites that can be "trusted" and one way of doing that is appearing on websites Google already trusts and displays on the first page of search results. [9]

4 Search Engines and Search Engine Optimization

Search engine optimization is the technique of making changes to the way a website's source code is viewed and indexed by search engines. The target is to locate those keywords that generate the highest and most constant traffic to the website and using these to improve the website's impression and click count. To better comprehend the process of search engine optimization, the way search engines work has to be understood first.

4.1 Morphology of Search Engines

As mentioned earlier the World Wide Web consists of interconnected links and these links can be seen as a real spider web. Starting from one point which is called a node the process continues and reaches another node with yet another node or other links. The software of which the search engine is composed is called a crawler, a web bot or a spider which depicts the way a spider moves on its web, and is similar to the search engine crawling practise. The search engine follows links till it reaches a final link till it has visited each page and collected data. This data is then modified and indexed in a more rapidly accessible format. The search engine processors are more than capable of performing numerous requests but the search process is much faster when using an index.

The stage following the crawling and indexing of a website is the user search process. When a user types in a keyword it is transferred to the search engine which conducts a search within the index. Then a list of search related links or topics is created and the algorithm evaluates each site and denotes a proper page rank to each result. This page rank determines how high or low on the search results page a link is displayed. The algorithm that calculates the page ranks is the most well-kept secret of a search engine because the relevancy of results determines the effectiveness of the search provider. [9] As figure 5 below illustrates, the search engine crawling and indexing process can be broken down to a few parts.

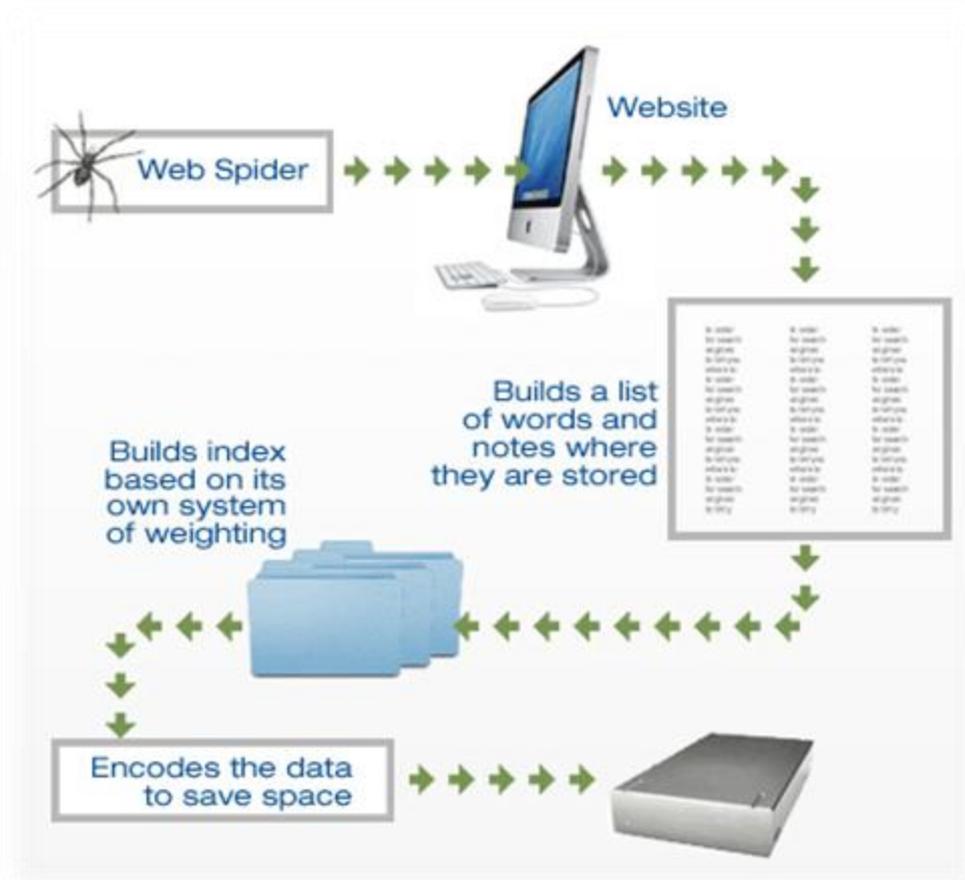


Figure 5. Search engine structure. [7]

The indexing process is fairly simple and standard for all search engines. What changes is the algorithm that each engine uses to evaluate the relevancy in the search results page.

Search engine providers build their reputation on the relevancy of their results and also on reliability of the sites these results link to. Most people tend to feel safe when using a search engine especially when it comes to well-known companies such as Google. People trust that when they click on a result they will not be redirected onto a site with malicious content that could harm them. This aspect is a high priority for companies in this business area and especially when it comes to the first page of results which they try to make as safe and relevant as possible. This is how Google has managed to pass onto people the concept of the phrase “Google it”.

Although not much is known of the constants that affect each search engine's page rank, it is safe to say based on abstract 1 published by Google on a patent that the history of a page or document are taken into account in the ranking process.

"A system identifies a document and obtains one or more types of history data associated with the document. The system may generate a score for the document based, at least in part, on the one or more types of history data."

Abstract 1. An abstract from a Google patent document. [20]

There are a many assumptions on what affects page ranks but some of the most trusted state that unique content and backlinks from well-known and trusted websites increase the liability and therefore the page rank of the website in question. [10]

4.2 Search Engine Optimization Components

Although there are many assumptions on what affects search engine results and rankings and the ways to improve them, it has to be noted that companies in the search engine business do not reveal their ranking algorithms in order to prevent website marketers and developers from using it to their advantage. Nevertheless, there are a few things which have to be known about how search engines do indeed work.

The data gathered from each website is obtained by the website crawlers which map the site and send that information to a datacentre to be analysed. Crawlers do not affect the ranking process but only serve as the means to pull data. If a website has previously been indexed by a search engine and it is crawled again at a moment it is down, for example for maintenance there is a chance the search engine will assume that the website has been deleted resulting in a lower organic listing page rank. This is more likely when there is no temporary page noting the website's status. [10]

The website has to contain a link structure with a start and an end. This enables search engine crawlers to map and collect information from the entire website. If a page is not linked to another page it is unlikely it is going to be crawled if not submitted directly to the search engine. Figure 6 visually displays the effect of each SEO factor.

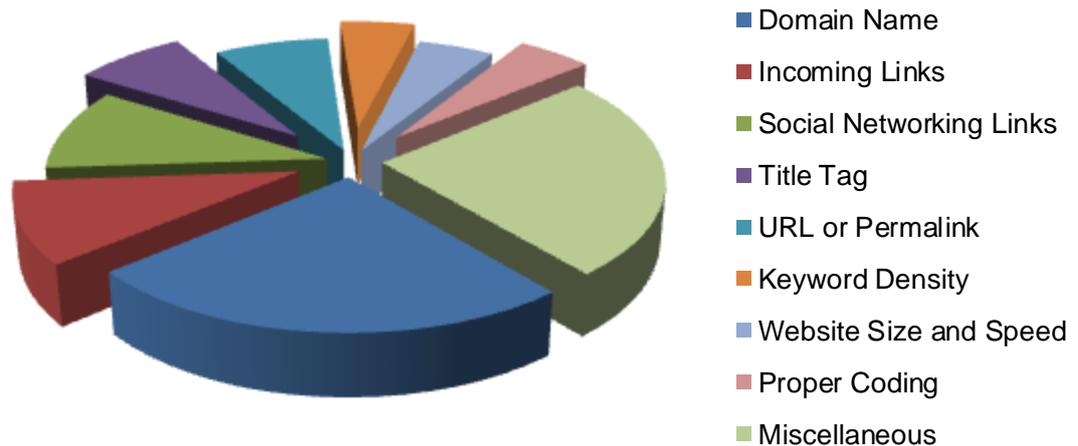


Figure 6. Factors that affect SEO as accessed on April 2013. [12]

It has to be noted that the domain of a new website has to be submitted to search engines. Otherwise it may take considerably long until it gets crawled by following links on other sites. It is not suggested to submit a website for listing multiple times as this does not improve its listing but rather lowers its ranking position. It is really important that the content of the website contains keyword phrases and keywords for which the website is optimized. [9]

As mentioned before, search engines prefer sites with fresh frequently updated content. Content is as important as anything else on a website and it is not only needed for the users to read but also for the search engines which will crawl the website for keywords and user friendliness and rank the page accordingly. New and up-to-date content indicates a website is a liable source of information compared to old material which is seen as not reliable anymore. Backlinks with anchor text are believed to enhance page ranking. For a website with frequently updatable content Google Sitemap is a good solution. It is possible that this will have a positive effect on the website's page rank because it is believed that sitemaps set up by Google Sitemap are crawled and indexed more. [9]

4.3 Search Engine Optimization

The purpose of search engine optimization (SEO) is about maximizing the exposure of a website in search engines and it does not directly focus on ways of increasing traffic to the website, although the reason and ultimate target of increasing visibility is to

increase the number of visitors. SEO is the process of making all the elements of the website easy to be found by exposing as much of the website as possible and using terms that the potential visitors would use. Competitive and successful SEO is the result of several variables which includes deep analysis of the website in question and of the competitor websites. A proper website architecture and design combined with link building are all crucial. Some methods proven to be affective include:

- Keyword relevancy to the website content.
- Interchanging of links with similar websites.
- New content to improve page rank.
- Submitting the website manually to search engines.
- Choosing correct description and title tags.
- Adding Meta tags and keywords tags.
- Fixing broken links and making sure all links work.
- Submitting up-to-date XML sitemaps to search engines.

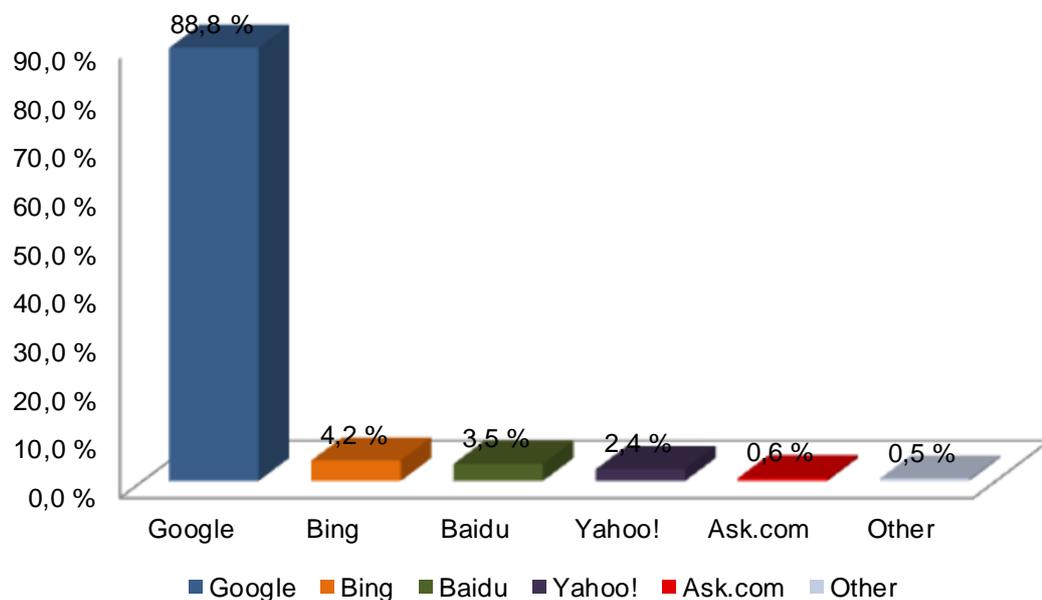


Figure 7. Search engine market share as of April 2013. [26]

As indicated in figure 7 above the most popular search engine is Google and it holds a massive 88.8% of the global search engine market share. [26] Statistically if a decision has to be made on which search engine to focus more that would be Google. Being left

out of Google's search results would simply mean losing an enormous amount of potential customers.

PageRank is also a very important part of an SEO strategy because website traffic would not increase sufficiently if the page ranked at the end of the search results. PageRank is an algorithm the Google engine uses to rate page relevancy. As described by Google,

"PageRank relies on the uniquely democratic nature of the web by using its vast link structure as an indicator of an individual page's value. In essence, Google interprets a link from page A to page B as a vote, by page A, for page B. But, Google looks at more than the sheer volume of votes, or links a page receives; it also analyzes the page that casts the vote. Votes cast by pages that are themselves "important" weigh more heavily and help to make other pages "important." [21]

5 Framework Implementation

5.1 Elgg Framework

Elgg is an open source framework that is designed to offer a flexible social networking engine out of the box. It comes packed with features such as blogging, microblogging, file shearing and networking. Elgg offers web administrators the basic components needed to create a social network. It works on the LAMP (Linux, Apache, MySQL and PHP) platform. This framework is quite flexible and the designer of the website can modify its various features by applying plugins that are available through the Elgg community or create them himself after familiarising with the inner structure of the framework. [1]

5.2 Elgg Data Model

In PHP application development a common method is embedding PHP content into HTML documents. This leads to a combination of logic scripts and views. The logic scripts are scripts dealing with the server side processing whereas view scripts are in charge of the visual arrangement of the website. On large and complex websites it becomes difficult to maintain the code as the number of lines increases. This approach would require both the web developer and web designer to work on the website at the same time so as to allow the creation of a website that is functional and aesthetically pleasing. This difficulty can be surpassed implementing a model that follows an MVC (Media View Controller) as shown in figure 8 below.

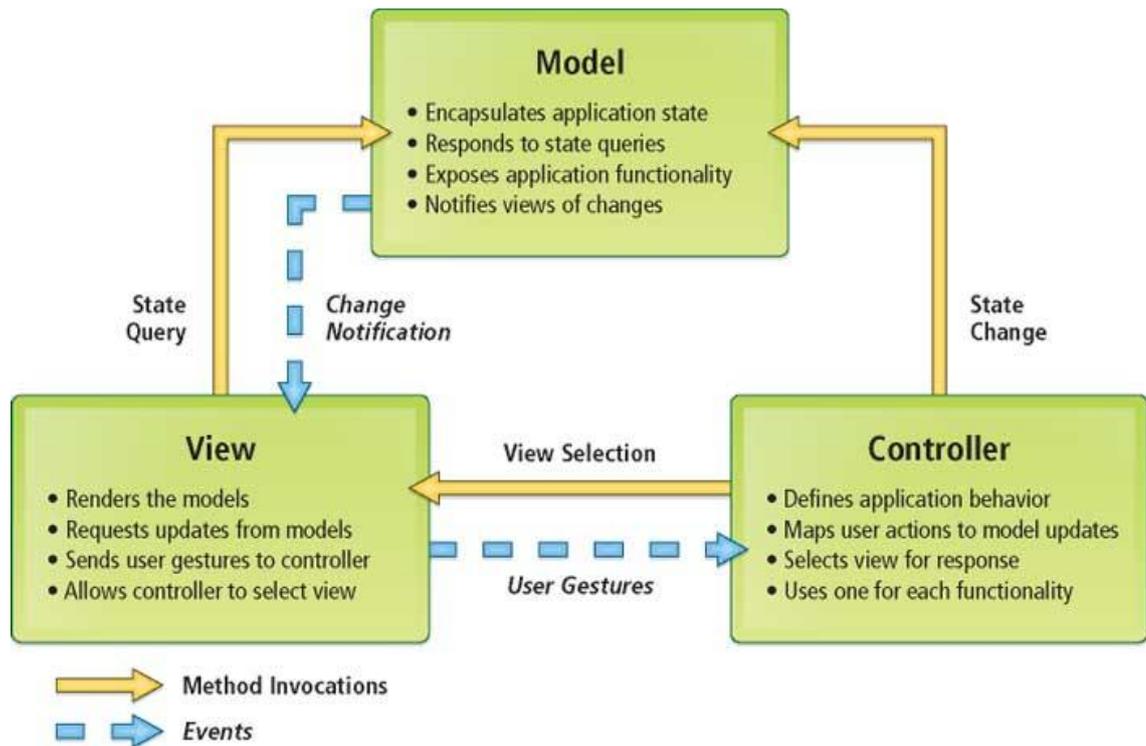


Figure 8. A diagram of the Model View controller architecture. [22]

The MVC pattern divides the code into three main components, the model, the view and the controller, thus separating the representation of information and the user's interaction with it.

5.2.1 Model

In the MVC architecture the model is an object which describes the representation of the data for editing, updating, handling and maintaining data stored in the database. Figure 9 represents the Elgg data model.

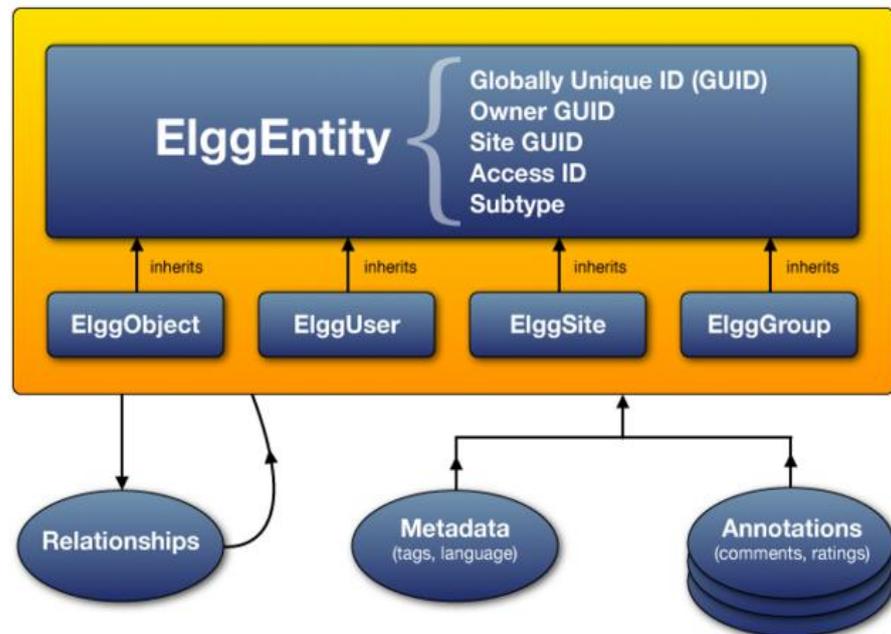


Figure 9. An illustration of the Elgg Data model. [23]

To put it more simply, it is the application core that maintains the data and states what the application represents.

5.2.2 Controller

Controllers are the link that provides the connection between the model and the view. Controllers deal with input data entered by requests (such as GET and POST) and provide them for the model. The action code is executed when a user takes an action such as submitting a form. When a user logs in or out the login or log out actions are brought up respectively. The action basically processes the input data from the form and modifies the database accordingly after which the user is forwarded to a new page carrying through the request. The central action handler is responsible for calling these actions. Figure 10 displays the controllers used in this project. [23]

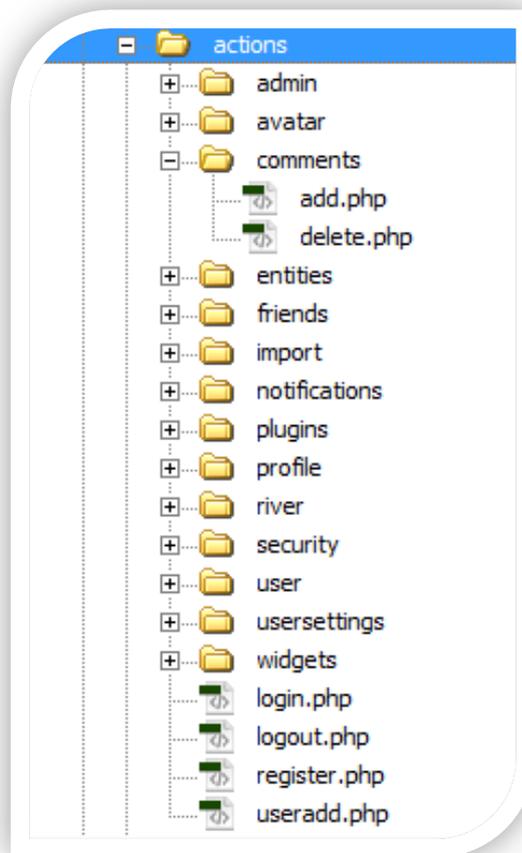


Figure 10. Screen capture of the controllers used in Edutorium.org as of April 2013.

Elgg events are triggered when something is deleted, created or updated. Events are determined by an object type (user, system and object) and an event name.

5.2.3 View

The view is the user interface which displays the information from the model to the user. It is a layer on top of the model which is capable of displaying information but not able to directly access or edit it. Every view creates presentation code from the input data. For instance the object/page view receives as input an ElggObject entity of the subtype of the subtype page creating the HTML code in order to display comments, text, titles and tags to the user. Views can interact with each other by calling another view which will have to receive the data from the model. [23] Each object that requires information from the model needs to be a registered view of the model. Figure 11

demonstrates how client requests are handled by the server and what a typical HTTP view response looks like.

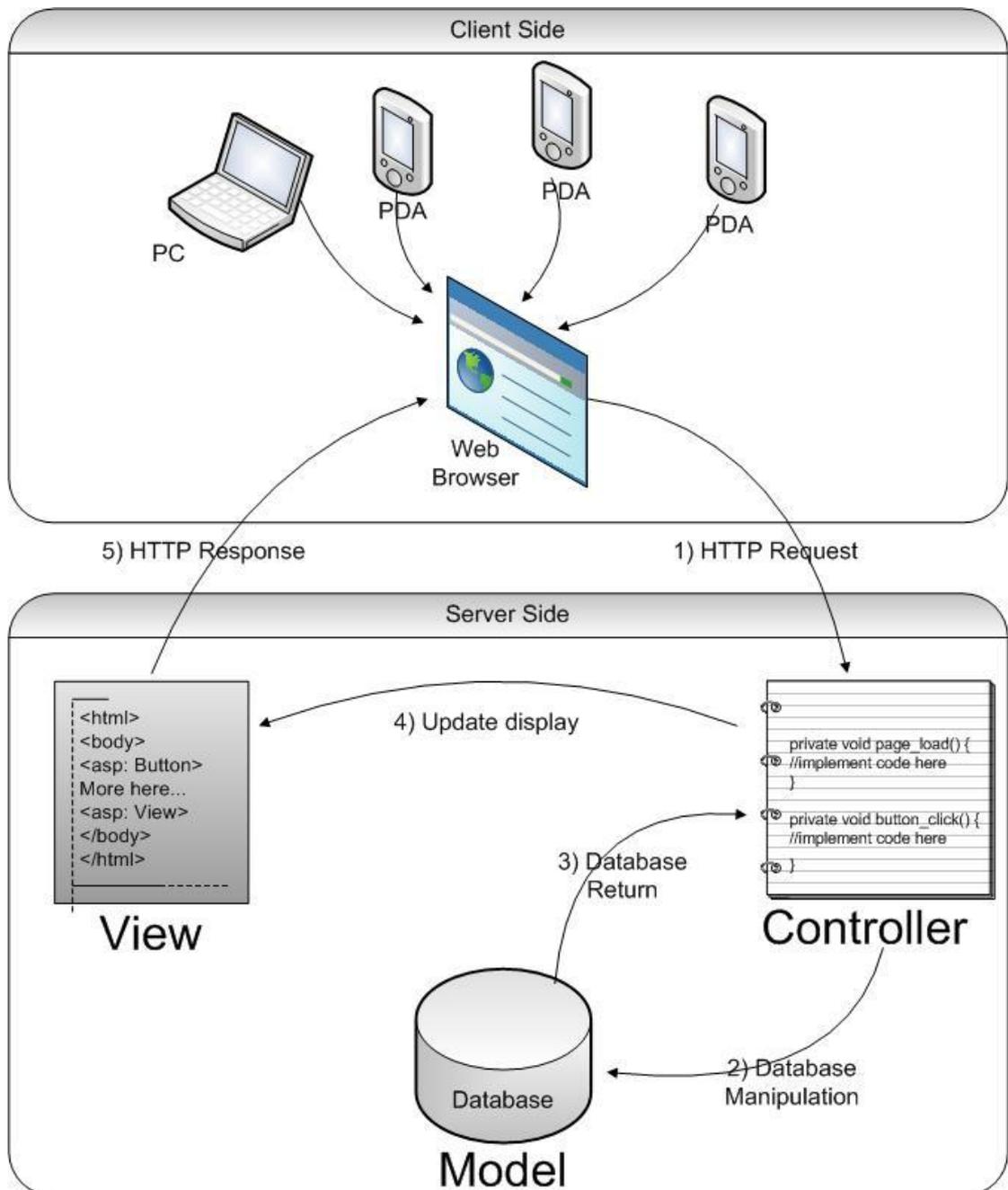


Figure 11. An illustration of a typical HTTP request and response on the MVC architecture. [24]

The MVC architecture is common in web applications in which the view is in HTML or XHTML. The viewtype determines the type of the document that is displayed. It is possible to define a viewtype that generates HTML for mobile browsers although HTML formatted for desktop browsers is the default generated viewtype. [24]

6 Edutorium

Edutorium.org is designed mainly for university and college students and enables its users to upload educational material such as essays and reports and share them with other users. It acts as an educational source, a cloud for scholastic material permitting the community to benefit from one's educational creations while granting its author complete privileges and proprietorship of his content.

6.1 Synopsis of Edutorium

Edutorium has been designed and developed having in mind an online educational repository which would have content created by users and for users with the power of an online community.



Figure 12. Screen capture of the Edutorium.org landing page as of April 2013. [29]

Edutorium.org can be accessed by anyone without requiring a registration first as illustrated in figure 12 above. The pages a user can access are far fewer when he is not logged in and downloading documents is limited although the files can be viewed and searched for. Being a registered member enables the user to upload content and create a personal space with widgets and settings. At the moment of writing there are no limitations in the number or size of uploads and downloads.

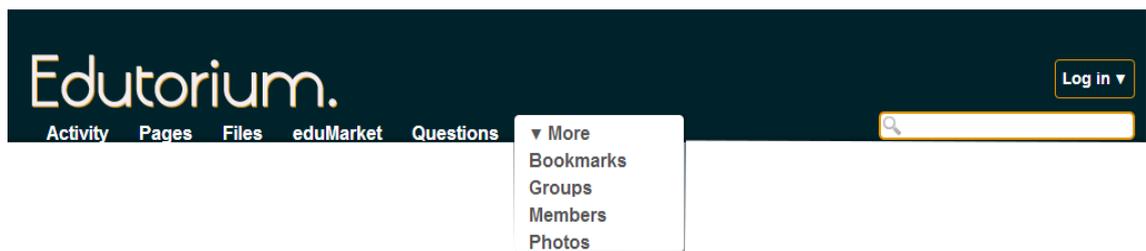


Figure 13. Screen capture of the visitor navigation bar as of April 2013. [30]

Figure 13 above illustrates the main navigation menu bar through which users can find their way on Edutorium.org. The designer has added the five most important shortcuts in the header row to be easily accessible and the rest under the “More” drop-down menu in order to save space and not to make the menu overcrowded and confusing.

6.2 Structure

The “Register” page enables the user to create an account on Edutorium.org. The details required for this procedure are a display name, an email address, a password and the reCAPTCHA verification. The reCAPTCHA is a free CAPTCHA service powered by Google which is challenge-response verification ensuring the user is not a computer trying to create non-valid accounts intended for spam. After filling in the needed information and successfully entering the CAPTCHA word, the user is sent an automated email containing a link to activate his account and enter the website for the first time.

The “Log in” page or drop down box allows users to enter the website using their user name or email and personal password. It is possible for a user to log in using the credentials he has from other popular social networks including Facebook, Google, Twitter, Windows Live and LinkedIn. This reduces the trouble a user might have in creating a new account when he can simply use the credentials of a pre-existing account he may have.

Similarly the “Log out” button logs a user out ending his session and redirecting him to the landing page.

The “Forgot password” page is for resetting a lost or forgotten password thus re-enabling access to the website and files.

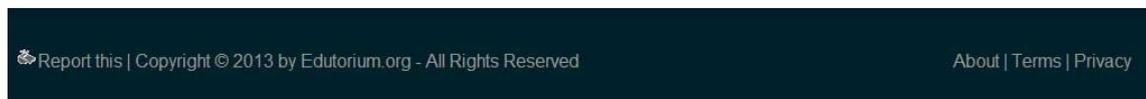


Figure 14. Screen capture of the website’s footer as of April 2013. [31]

The “Report this” link is only displayed to logged-in users as seen in figure 14 and serves the purpose of helping control unsuitable content. A user can report a page for containing content that he feels should be removed. This sends a notification to the administrator of the website who will decide in the end to remove the content.

The “About” page contains a short description of who Edutorium.org is intended for and why to use it. The two other pages, “Terms” and “Privacy”, contain the terms of use of the website which are of high importance because Edutorium.org is intended to hold copyright sensitive content.

The “Activity” page includes the latest updates from the community. These updates consist of status updates, new file additions, bookmarks, new members and new connections between the website members.

The “Pages” page holds all the pages of the website. It includes pages created by members some of which might be hidden due to being classified by the author as private. There is the possibility to limit the audience or the editors to the author’s connections or simply only to himself.

The “Files” page is a repository for uploading documents and files. These files can then be downloaded and saved to a user’s computer or just viewed briefly. Most common file types are supported, and as with “Pages” the uploader can control who can access or edit the file.

The “eduMarket” page is a board for posting ads related to educational material. For example a user can post an ad about a marketing analysis that he needs help with or an ad about a book or a report he wishes to buy. The user may even write a price for

what he/she is willing to pay and if another user is interested they can contact through messages.

“Questions” is a page on which users can ask questions and someone from the community can give an answer. This is similar to Yahoo! Answers but on this website the questions are limited to education.

The “Bookmarks” page is an area where users add useful or interesting links accompanied with a description and tags to make it easier to be found in search results. These bookmarks can range from university websites to plagiarism identification software.

The “Groups” section is a page that contains groups created by users. These groups for example can be created for courses such as a marketing course in which the students need to share information and be updated about changes.

The “Members” page contains a list of all the users of the website displaying only basic information about them. In the “Photos” section users can add photos.

6.3 Registered Users

Although Edutorium.org is open to anyone, unregistered users have some limitations. Registered users on the other hand can use Edutorium without limitations or fees.

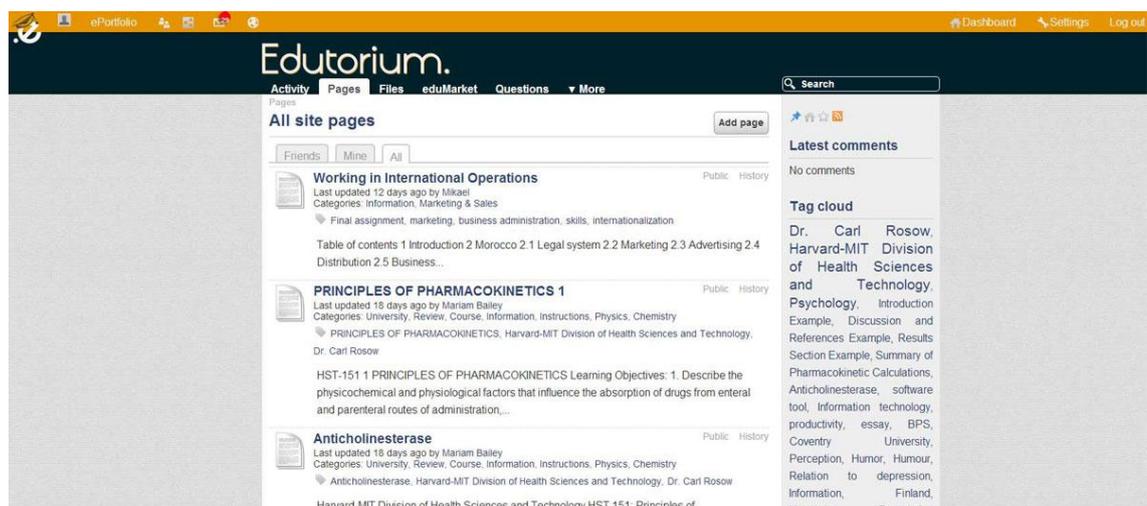


Figure 15. Screen capture showing the “Pages” page and the logged in user navigation bar. [32]

As illustrated in figure 15 when a user logs in he will get more controls over his account including the “ePortfolio”. The ePortfolio is an online resume of the user which even uses an algorithm to calculate the overall resume competitiveness ranking universities and degrees. It is very useful because it increases the visibility of a resume. “Settings” allows the user to control functions of his account such as language, user name and email. Convenient controls including the user profile, friends, groups, messages, and general notifications display new comments on the user’s page or in files and on pages he has created.

After a user registers with Edutorium.org and logs in, a whole new dimension of the website will unfold in front of him. He will not only see visual changes or simply have the ability to create and control his profile but he will also be able to upload content, edit it and create his own page that can then be viewed by thousands of potential readers. When a user uploads a report, an essay or any kind of document he has written, he is thereby ensuring his rights so that if someone unlawfully uses it as his own creation, he can prove at any time that it has been previously published by him at a specific time and in a specific place according to the server’s time stamp.

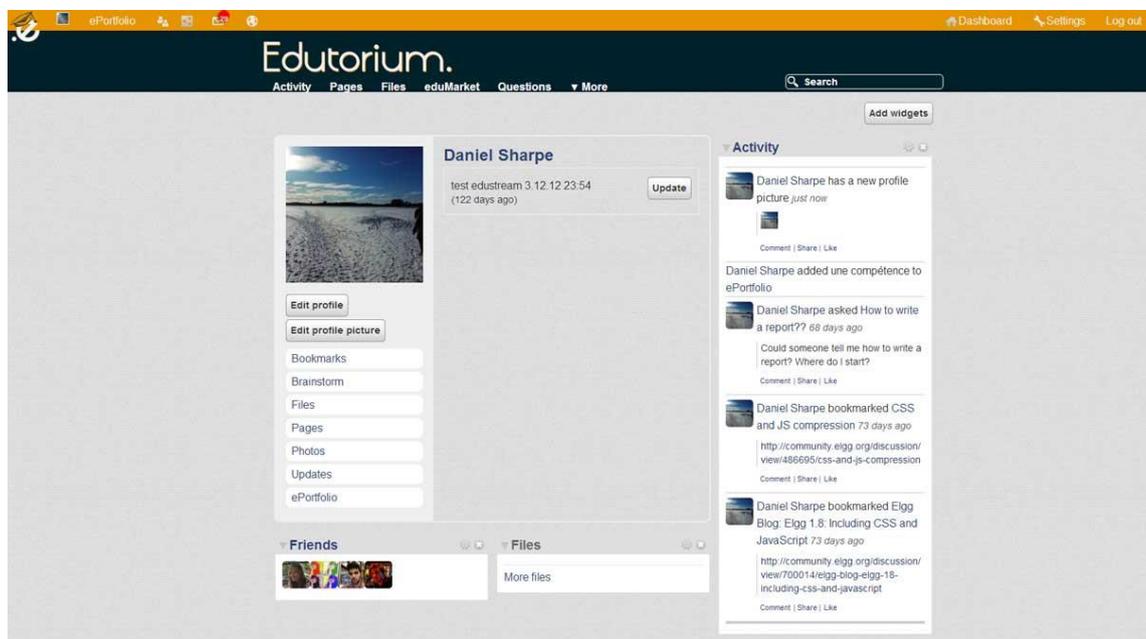


Figure 16. Screen capture of a user’s profile page. [33]

Figure 16 shown above illustrates the user profile page on which widgets can be added to improve the user experience and increase the level customizability resulting in a

more personalized page. The profile page displays the most important information about a user such as user name, occupation, skills and latest activity and can be used to search for the user. This allows other users to search for users not only by name or location but rather by any feature. For instance if a user is in search of someone with business skills or knowledge of mathematics, he can get a list of users with the criteria that match his needs.

The “Dashboard” is the page on which each user creates can add widgets that he uses often and increase productivity. The user can use iFrames to open 3rd party websites inside his dashboard. The widgets work as shortcuts to many applications of the website and can display the most recent updates about new questions or files added. A user is given the possibility to add custom widgets just by adding HTML code to the widget’s text area.

The “Messages” page includes a user’s messages. Messages can be sent from any user to another without requiring for them to be connected first. This allows freer interaction between users and the possibility to contact someone when in need of help.

6.4 Administrators

The administrators have the obligation to control and manage the website in such manner that it operates without errors and violations of the websites terms and conditions. The administrators have the power to:

- Ban and delete user profiles
- Delete comments on any page and section of the website
- Add, edit and delete pages of the website
- Delete uploaded files
- Delete photographs uploaded by the users
- View all user information
- Reset passwords
- View detailed statistics about traffic and used activity

The following figure depicts the administrator control panel.

Figure 17. Screen capture of the administration page of Edutorium.org as of April 2013. [34]

Some of the tools that the administrators have access to are shown in figure 17 in the right-hand side panel. The dashboard of the page shows some important information about new users and the content they are using. The administrators can view any user's log file which contains all his actions on the website, so if a user performs an action that violates the terms of use he can be tracked and stopped.

The statistics section has tools that mainly focus on the server load and so much on the visitor count. The "users" tools allow the administrator to control almost everything that has to do with the users. The administrator can ban, delete, validate, and view new users and export them to a downloadable file. The "utilities" menu contains the user logs and the reported content from the users and is able hereby to act accordingly.

The configuration tools allow controlling the way the website looks and functions. Menu items from the main site menu can be added and removed from here. The settings that are below the "appearance" focus more on the way the website engine functions and the routine actions that need to be taken in order for the website to run flawlessly.

7 Conclusion

The purpose of this project was to analyse how search engine optimization and social media optimization in combination with other online marketing practices help to increase the overall worldwide reach of a website and drive traffic to it. The author also wanted to compare the techniques and practices competitor websites use to dominate the online world, and to some extent there are many similarities in terms of common guidelines and methods. This project gave useful insights to better understand how search engines work and which online marketing practices it is more sensible to use on a new website. This final year project took more than two months to complete but the results and overall outcome while using the Elgg framework and marketing the website after its launch were well worth the effort.

Today the World Wide Web offers unlimited information and online encyclopaedias which are constantly updated. Edutorium.org is meant to fill the gap between the traditional classroom education and the online education by offering online material created by “in classroom” students thus supporting the limitations in e-education.

The social media reach is astonishing and it is a powerful tool when it comes to promoting a new website. Acquaintances are far more likely to visit and embrace a website than random Google search referrals. This is a chain reaction and through the word of mouth a website worth visiting will eventually spread through the social networks in which there has been a targeted marketing effort, sometimes even virally. Social network referral traffic can often generate high visitor count in a short time frame due to the trust towards the referee already being established thus trusting the suggested website. Social network marketing can also be inexpensive or even free and the only missing piece required is effort to constantly attract new connections.

While designing Edutorium.org, high priority was given to the user experience (UX) and SEO friendliness in order to make it easily indexable by search engines and especially Google. This will increase the traffic of search engine organic results, therefore, increasing the overall visitor number and allowing for advertising on the website to generate income in the future. Making the website SEO friendly not only serves the website’s purpose but also allows potential customers and users interested in a site Edutorium.org to better locate it among millions of other websites on the Web.

Edutorium.org has been registered as a domain and is currently online. Google analytics are being used allowing for a better monitoring of keywords leading to the website and the countries from which the visitors are the most active. At this moment most of the registered users are referral traffic visitors but there are also a few registered users who found the website from organic traffic.

The Edutorium.org online marketing is bound to change according to how people react to new trends. For the time being the main focus is on social media marketing and search engine optimization. SEO changes can take months to be detected by search engines and positively affect the PageRank. Constant fresh content is another important factor currently being performed on the website. The project has been successful and all possible areas have been analysed and resolved. The author is looking forward to Edutorium.org benefiting and seeing constant growth resulting from the various optimizations performed.

References

1. What is Elgg? [online]. Elgg.
URL: http://docs.elgg.org/wiki/What_is_Elgg. Accessed 23 February 2013.
2. Michael de Kare-Silver. E-shock 2020. Pargrave Macmillan: Great Britain; 2011.
3. This is how much time you spend on Facebook, Twitter, Tumblr [online]. Mashable.
URL: <http://mashable.com/2012/11/28/social-media-time/>. Accessed 7 April 2013.
4. Working with client-side script [online]. Microsoft.
URL: <http://msdn.microsoft.com/en-us/library/aa479302.aspx>. Accessed 5 March 2013.
5. Server-side scripting [online]. W3Schools.
URL: http://www.w3schools.com/web/web_scripting.asp. Accessed 2 March 2013.
6. Client-side scripting and HTML [online]. W3C.
URL: <http://www.w3.org/TR/WD-script-970314>. Accessed 3 March 2013.
7. Anatomy of search engine optimization – Traffic, content & links [online]. Natffin.
URL: <http://www.natfinn.com/anatomy-of-search-engine-optimization>. Accessed 6 March 2013.
8. Organic search engine results versus paid search engine results [online]. Net Registry.
URL: <http://www.netregistry.com.au/blog/seo/organic-search-engine-results-versus-paid-search-engine-results>. Accessed 6 March 2013.
9. Jr. Jerry Lee Ford, William R. Stanek. Increase your web traffic in a weekend sixth edition; 2010.
10. Damian Ryan, Calvin Jones. Understanding digital marketing 2nd edition. Kogan Page Publishers; 2012.
11. David Amerland. Online marketing help. New Line Publishing; 2011.
12. Toni Ahlqvist; A. Bäck, M. Halonen, S. Heinonen. Social media road maps exploring the futures triggered by social media. Technical Research Centre of Finland; 2008.
13. Social media: The number one way to spread the news [online]. Practical social media.
URL: <http://practicalsocialmedia.com/general/social-media-the-number-one-way-to-spread-news/>. Accessed 13 March 2013.
14. Lutz. The findability formula: The easy, non-technical approach to search engine marketing. New Jersey: Wiley; 2009.

15. World Internet users statistics usage and world population stats [online]. World Stats.
URL: <http://www.internetworldstats.com/stats.htm>. Accessed 13 March 2013.
16. The value of lower search volume [online]. Search Engine Watch.
URL: <http://searchenginewatch.com/article/2252622/The-Value-of-Lower-Search-Volume>. Accessed 13 March 2013.
17. Google AdWords: Keyword tool [online]. Google AdWords.
URL: <https://adwords.google.com/o/KeywordTool>. Accessed 14 March 2013.
18. A keyword map for the whole Internet [online]. KwMap.net.
URL: <http://www.kwmap.net/>. Accessed 17 March 2013.
19. Top 15 most popular search engines [online]. eBizMBA.
URL: <http://www.ebizmba.com/articles/search-engines>. Accessed 17 March 2013.
20. Information retrieval based on historical data [online]. Google.
URL: <http://www.google.com/patents/US7346839>. Accessed 18 March 2013.
21. What is PageRank? Learn about Google PageRank [online]. Google.
URL: <http://www.googleguide.com/pagerank.html>. Accessed 19 March 2013.
22. Pleasing bosses and customers [online]. Esri.
URL: <http://www.esri.com/news/arcuser/0609/aspnetmvc.html>. Accessed 20 March 2013.
23. An overview of Elgg mechanism [online]. Toyhouse.
URL: <http://toyhouse.cc/profiles/blogs/an-overview-of-elgg-mechanism>. Accessed 20 March 2013.
24. Management system [online]. UNC Charlotte.
URL: <http://fcl.uncc.edu/nhnguye1/danceComp.html>. Accessed 20 March 2013.
25. Top ten countries by Internet usage [online]. Maps of World.
URL: <http://www.mapsofworld.com/world-top-ten/world-top-ten-internet-using-countries-map.html>. Accessed 27 March 2013.
26. Search engine market share [online]. Karma Snack.
URL: <http://www.karmasnack.com/about/search-engine-market-share/>. Accessed 3 April 2013.
27. Search engine optimization [online]. Brianlis.
URL: <http://brianlis.com/services/search-engine-optimization-seo/>. Accessed 3 April 2013.
28. Fred Cavazza. Do not chase shiny objects in social networking. [online].
URL: http://alliance-strategies.com/Alliance-Strategies_Blog/?p=106. Accessed 23 February 2013.

29. Edutorium [online]. www.edutorium.org.
URL: <http://www.edutorium.org/>. Accessed 30 April 2013.
30. Edutorium.: All site files [online]. www.edutorium.org.
URL: <http://www.edutorium.org/file/all>. Accessed 30 April 2013.
31. Edutorium.: All site bookmarks [online]. www.edutorium.org.
URL: <http://www.edutorium.org/bookmarks/all>. Accessed 30 April 2013.
32. Edutorium.: All site pages [online]. www.edutorium.org.
URL: <http://www.edutorium.org/pages/all>. Accessed 30 April 2013.
33. Edutorium.: Administration panel [online]. www.edutorium.org.
URL: <http://www.edutorium.org/administrator>. Accessed 30 April 2013.

