Conference Paper

Models and Methods of Promoting Educational Services in the Internet Marketing

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Abstract

Web technologies and Internet marketing provide universities with new opportunities to organize more effective interactions with consumers of educational services. The educational portal of the university becomes a single point for the interaction of the university with all categories of interested persons. Modeling the structure of the educational portals, taking into account the behavior and preferences of consumers of educational services become especially relevant. The aim of the study is to analyze the processes related to the development and maintenance of the effective functioning of educational portals of higher education institutions, to model their structure, and to study the possibilities of using them to improve the quality of promotion of educational services.

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Received: 10 February 2018
Accepted: 14 April 2018
Published: 7 May 2018

Publishing services provided by Knowledge E

Selection and Peer-review under the responsibility of the RFYS Conference Committee.

1. Introduction

One of the main university development strategies is the widespread introduction of information technologies to create a single information and educational environment on the basis of an educational portal. The creation of the educational portal provides a single point of access to data, information systems and services of the university, which are available to the user in the required format [1]. However, the university's website can be an effective marketing tool to attract consumers of educational services and form positive University image. This is crucial for each institution to be reckoned with in conditions of high competition [2].

2. Statement of the problem

Web technologies and Internet marketing technologies in particular, give universities new tools in relations with consumers of educational services [3, 4]. The educational portal becomes a single point for interaction of the university with all categories of

interested persons: entrants, students, employers. As a result, there is a problem of effective organization and promotion of educational portals in the Internet marketing system. Modeling of the educational web portal structure is based on the of analysis of user behaviors, perceptions and preferences become especially relevant. The aim of the research is to analyze the processes associated with the development and maintenance of the effective functioning of educational portals, modeling their structure, and explore possibilities of their use for quality improvement of educational services promotion.

3. Solution

In order to assess the quality of the educational portal as an effective mean of promotion of educational services the following criteria were observed:

1. Requirements to the content of the educational website: relevance of information and maximum possible information according to user requests, current information, completeness, reliability, accuracy and correctness of the information available on the portal, structuredness, availability of multimedia tools, the focus of information materials on the target audience.
2. Requirements for design: presentation, Brand-driven web page design, usability, interactivity.
3. Technical requirements: download speed, the ability to use in all newest browsers and devices, adaptability, e-service, security, reliability, accessibility, etc.

To assess the capabilities of educational portals to identify their strengths and weaknesses with regard to the methods used, a technical audit of the sites of the universities-competitors was carried out [5].

The methodology includes analysis of competitors' sites in the following areas: analysis of traffic sources; evaluation of advertising effectiveness; definition of the most popular searches and pages; bounce rate analysis; determining the characteristics of the target audience; keyword frequency text Analysis; site indexing; analysis of site positions in search engines; the analysis of site traffic; registration of a site in search catalogs; the page speed insights; the analysis of search engine optimization (SEO); the presence of microdata markup like Schema.org or Open Graph; the presence of analytics counters on the site (Google Analytics, Yandex Metric, Open Stat, Live Internet, etc.); social media presence index (SMPI); the presence of a mobile version of the site; the relevance; latent semantic indexing of keywords (LSI), level of trust

(authority, citation) of the web in search engines (TrustRank or Web of Trust (WOT)), etc.

Web analytics systems define keywords and queries of competitors 'sites only at the time of analysis, so we created our own tool for parsing information from competitors' sites.

To optimize the structure of the educational portal a mathematical model have been developed. This model describes the dependence of user behavior and preferences from the structure of the educational portal and informational content of its web pages [6].

Using Yandex Metrics, Webvisor technic, and also developed a custom script has been generated statistics and user behavior on the educational website in the form of a report including the total time and the time spent by each user on a specific page of the website. Yandex Metrics, Webvisor technic, and developed custom script were used to gather statistics of user behavior on the educational website. The database includes the total usage time and the time spent by each user on a specific web page.

Let the given matrix ||Uki|| be the matrix containing the source data on the 'k' user behavior on 'i' page. ||Uki|| = (U1, U2,... Uk), where k=1,...K, and 'K' is the number of users.

The multiple linear regression equation is shown below:

$$Y = C_0 + C_1 \times U_1 + C_2 \times U_2 + \ldots C_i \times U_i + \ldots + C_m \times U_m, \quad (1)$$

where Ui is the average time the user spent on page 'i'. The sample size is equal to 'K' - the total number of users in the database.

In the process of constructing a multiple linear regression on the results of site visits by different users the regression coefficients Co, C1, C2,... Ci,... Cm are determined. The numerical value of the coefficients gives an estimate of the influence of information on every web page on the user and therefore, on the system target. Thus we obtain a numerical estimation of influence of the web page on the time of the user's stay on the landing page of the educational portal.

That information allows us to organize the factors according to their importance and delete or reorganize unimportant pages and hyperlinks of the site structure. Figure 1 presents the results of the regression analysis.

The proposed approach allows to coordinate provide information on the site about educational services with the interests of users, which in turn is necessary for the promotion of educational services on the Internet. This information is used to reconfigure

the structure of the portal in order to attract a larger audience of people who would be interested in the educational services.

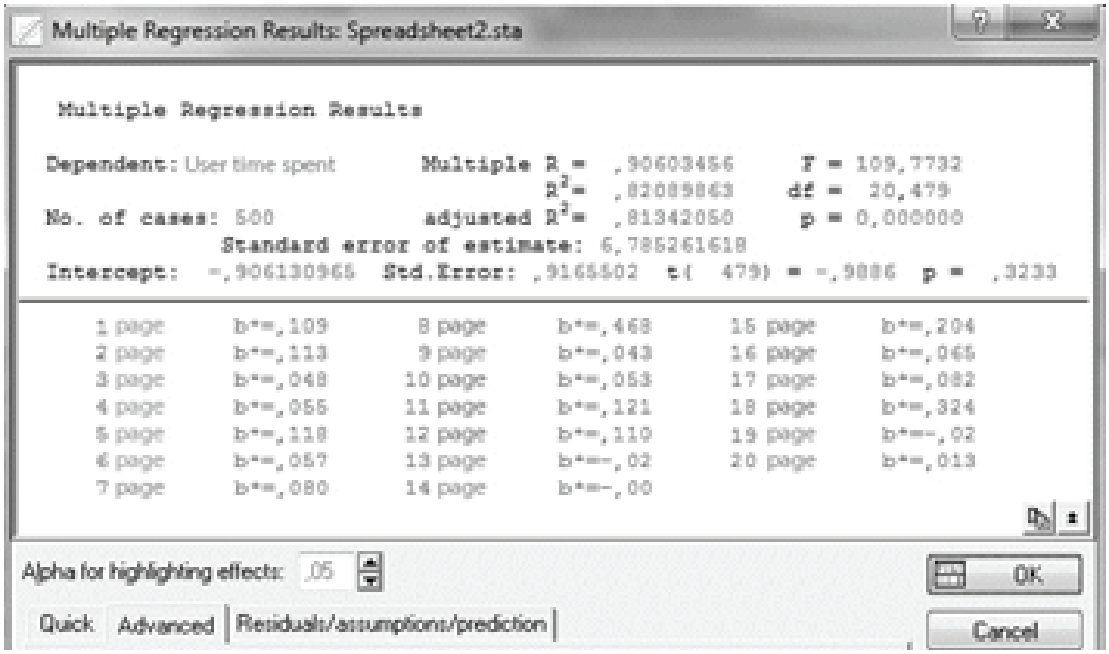

Figure 1: Results of regression analysis.

4. Developed methods and models

In the process of creating an educational portal the UML - model of the information system has been developed. The complex of interrelated information models of the educational portal has enabled more accurately reflect a rational structure and functionality of the portal based on analysis of the goals and information needs of different categories of users, taking into account quality requirements of the portal, and thereby to form the portal structure. The architecture of the educational portal involves the effective organization of data, and structuring of information resources, necessary the target audience. The model of the portal structure is adjusted for each category of users and makes the work with the site more convenient. Figure 2 shows the architecture model of the educational portal of the university.

To ensure the possibility of promoting educational services through the educational portal, a method based on web analytics tools was developed for the formation and use of the semantic core of portal. This method allows you to optimize portal structure in accordance with the requests of its potential users. To ensure the relevance of the pages of the educational portal for the search engines, it is necessary to find a match between the subject of the educational portal and a set of search queries [5].

Figure 2: Architecture of the educational portal.

A set of keywords was obtained with the help of Yandex Wordstat by analyzing search queries of users interested in information about the educational services. The results of the analysis formed the semantic core of the site, which subsequently is taken into account in the optimization, or rather, during the relinking of resource pages (linking pages of the website together with hyperlinks). If the links are words from the list of keywords, then the quality of internal linking will be improved significantly. In addition to optimizing educational portal for search engine formed semantic core may be used for media advertising (the keywords for displaying ads are selected from a semantic core; the same search phrases included in the text of the ads) and ordinary advertisement (the text of advertising about educational services includes the most frequent search phrase from the core, suitable to the topic).

A promising direction of creation of the educational portal is an application of Semantic Web technologies for organizing effective storage and retrieval of data. For these purposes the model of portal knowledge was created. The model presented in the form of Web ontology describes the structure of information resources of the educational portal. For modeling the ontology of the educational portal the ontology editor Protege 4.3 was used. Figure 3 shows the ontological model of the University educational portal.

The created ontology corresponds to the most extent to the knowledge structure of the domain of the educational environment that ensures the relevance of the information search queries. The architecture of the information system based on ontologies is

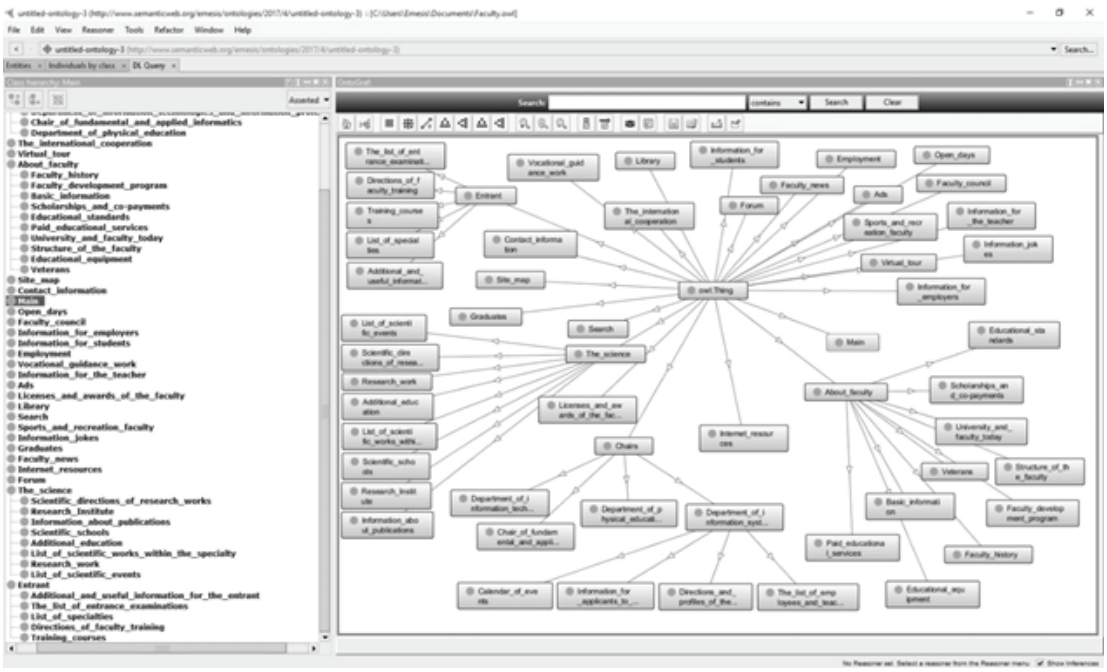

Figure 3: Fragment of the university portal ontology.

open to additions of new ontologies. Changes in one component do not cause major changes in other components. This architecture of the educational portal allows the development of separate sections, fill them with content independently, make quick changes and add new functionality to the system [7].

Among the main quality criteria of the university web portal capable to promote educational services are the usability indicators of the site. For the evaluation and optimization of the educational portal usability parameters were used the following methods:

1. Analysis of statistics using web analytics systems Yandex Metrics, Google Analytics, etc. For this purpose, installation of counters was made on each page of the educational site.
2. Organization of feedback through surveys, questionnaires and forms from visitors in order to obtain the information about the educational portal.
3. Testing the ergonomics and usability of the site based on website optimizers from Google, Yandex and other systems.
4. The usage of the website tools such as Google Analytics, Webvizor Yandex Metrics for tracking, analyzing and processing all user actions on the website.
5. Using information from log files to analyze data about the behavior of visitors on the site (statistics on downloadable content, website traffic, etc.).

6. Using SEO optimization techniques.

The following characteristics of "usability" were analyzed:

1. Performance indicators of the user's behavior before the acquisition of educational services (the time the user spend on each page of the site and in general; the time the user searches the information interesting for him on the site; the number of clicks on the website of the user; the number of pages per user visit).
2. Performance indicators of the site (the number of site errors from the user's point of view; boot time, response time, number of failures, speed, etc.).
3. Error indicators relating to the linguistic aspect of the site quality (matching the names of menu items and fields are the user's expectations; the ability to fill accurate data; the relevance of the information on the website, etc.)
4. User interface quality indicators (the quality of the location of the various components of the site's screen, the color and styling of the site, the optimal location of elements of the site interface, the effectiveness of the site structure, the search efficiency, the amount of text and graphics on the page, the organization of the dialogue with the user; the presence of the xml map of the educational site etc.)
5. Target indicator that assesses whether the users reach its target on the website (defacto). This indicator is checked with the help of questionnaires, mailings, or expert evaluation of the site.

5. Conclusion

Analysis, testing and usability evaluation helped to optimize the web portal in accordance with the selected quality indicators. The result of this research was the creation of the final innovative product "PROMO-2017" for educational institutions for presentation and promotion of educational services. The modules of the system can be integrated into existing tools for creation of web applications (collection and analysis of statistical data about user behavior in the dynamic mode; automatic grouping of users with the aim of applying to them the common strategy of content presentation).

The advantages of the new approach for presentation and promotion of educational services will significantly improve the efficiency of the education portals of higher institutions by implementing the following functions:

- minimization of organizational and financial costs for the promotion of educational services on the web-portal,

- dynamic analysis of user needs depending on his actions and queries, automation of processes of collecting and processing information about users of the educational portal,
- adjustable user interface and the portal structure according to the analysis of incoming user requests and their actions,
- quick setup and reconfiguration of the educational portal based on the processing of expert assessment, quality indicators and on the evaluation of user satisfaction with portal,
- instant collection of information on applicants and employers, and quick response of the university according to changes in the market of educational services [8].

References

[1] Norenkov I P, Sokolov N and Uvarov M Yu 2009 Adaptive environment for the development of educational resources *Nauka i obrazovanie* **3** 44-56

[2] Vorobeva A M 2011 Methods of promotion of educational services through educational portals

Voprosy sovremennoj nauki i praktiki. Universitet imeni V.I. Vernadskogo **3(34)** 96-102

[3] Vorobeva A M 2012 Methods of promotion of educational services in Internet marketing *Kazanskaya nauka***5** 78-80

[4] Zavalko N A 2011 Issues of educational services marketing *Vestnik Omskogo Universiteta – Herald of Omsk University* **3** 119-123

[5] Vorobeva A M 2012 Models of promotion of educational services in the system of Internet marketing V*estnik SevKavGTI – Scientific bulletin. SevKavGTI* **12** 57-62

[6] Shpolianskaya I Y and Vorobeva A M 2012 Models and methods of optimization of structure of educational portals of high schools in internet marketing system *Vestnik Rostovskogo gosudarstvennogo ekonomicheskogo universiteta (RINH) – Vestnik of Rostov State University of Economics* **1 (37)** 301–311

[7] Shpolianskaya I Yu and Miroshnichenko I I 2010 Formation of the ontological Registration rules of model of information the materials represented and educational space in journal of division of university *Vestnik Rostovskogo gosudarstvennogo ekonomicheskogo universiteta (RINH) – Vestnik of Rostov State University of Economics* **31** 201-209

[8] Shpolianskaya I Yu and Misichenko N Yu 2016 Development of CRM System for Interaction of the University with Graduates and Employers *Vestnik Rostovskogo gosudarstvennogo ekonomicheskogo universiteta (RINH) – Vestnik of Rostov State University of Economics* **3 (55)** 85-92

[9] Web Content Accessibility Guidelines (WCAG) 2.0. W3C Recommendation 2008 Available: http://www.w3.org/TR/2008/REC-WCAG20-20081211/