

## Quantitative Indicators of Academic Libraries' Involvement in Educational Process

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**Abstract.** *The biggest wriggle in developments of libraries is happening in field of libraries' services where existing services are enhanced with new functionalities and completely new services are introduced. In recent years there is a great boom of educational services empowered with new technology. The average user is overloaded with great amount of information and librarians must constantly and systematically transfer different skills to their users. In this paper quantitative results of presence of educational services on academic library web sites are presented indicating their involvement in educational processes.*

**Keywords.** Academic libraries, content analysis, data mining, educational services.

### 1. Introduction

Nowadays academic libraries are increasingly becoming resource centers for continuous learning and research, broadening their focus to access and supply of information.

Modern academic libraries try to develop new innovative services in today's competitive environment to give their contribution to university excellence [13].

User-centered services are the primary mission of the library and library profession is service-oriented. In delivery of information and services to users libraries mostly use their web sites.

Namely, even development of library web sites started about seventeen years ago it is still a great challenge to build a robust library web site with all functionalities needed by more and more demanding users.

During the creation and maintenance of the web site libraries try to follow usability, accessibility, navigation and design standards.

According to [11] there is a lack of documentation and standards for information architecture but still libraries follow different kinds of recommendations, guidelines or templates made by their parent institutions or external body, mostly dealing with accessibility. Creation of the content of library web pages is mostly responsibility of the library and therefore unique and specific achievement for each library. Striving to attract more high-achieving students universities are improving quality of their teaching and research processes in which libraries are inseparable participants. Libraries support teaching and research processes at the university, but they also take more active role in users' education. The average user is overloaded with great amount of information and requires constant and systematic transfer of different skills. There is variety of educational activities in academic library and that's why whole library with all its collections and offered services could be considered as educational tool. Also virtual representation of the library through library web site, empowered with technology, educates library users all the time in every segment. Still quantification of educational services which are present at academic library web sites requires selected terminology and focus on educational aspects that can be measured.

Therefore research question stated in this paper is to find out relation between some words and/or phrases, considered as indicators, which represent educational services on academic library web sites and academic libraries' involvement in educational process?

## 2. Scope

Following a research question the main goal of this paper is to explore elements of academic library web site content to find out variety of educational services on academic library web sites and try to categorize them. Library web sites are the first contact of library and user and further frequency of visiting library web sites mostly depends on users' impression, easiness of use, content richness and good organization of information sources and services on homepages. That's why is extremely important to consider library web pages to find out basic content categories. Educational services are the most growing segment of library services in recent years although it is very hard to separate these services from other library services, e.g. from information and reference services, and from learning resources included in library collections. In fact Babalhavaeji et al. stated that rapid development of information technology has highly transformed library service at spectacular rate [2]. Bangert points out that libraries could contribute to education in different ways for example with smart collection development and organization of information sources, teaching about knowledge organization and creation of environment which encourages reading and critical thinking [3]. Recognition of their own role in supporting teaching and research libraries usually mention within their mission statements using terms like support to educational program, enabling access, teaching of information skills, making better learning outcomes, learning support, research support, assuring lifelong learning for university employees and others. Following rapid development of distance learning and e-learning university programs library services are operating within the world which is user-oriented and self-learning [9]. Academic libraries' involvement in educational process could be through advanced access to digital information sources, helping teachers and students in finding relevant information sources and developing their information literacy skills [6]. According to American Library Association [1] information literacy is a set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information. Bawden defines information literacy as efficient use of information during solving problems [5]. Teaching about information literacy mostly encompasses writing skills, literature citing skills, information

retrieval skills, teaching about copyright and plagiarism. Also for scientific and research needs libraries teach topics from bibliometry.

## 3. Method

### 3.1. Sample

Although web makes possible easier data gathering its size and pace of change make a choice of random sample difficult to perform. Sample of web sites can be chosen by IP addresses or URL addresses, search engines, lists of the most popular web sites according to specific criteria or combination of these methods. In our case purposive sample can assure rich and representative content for analysis and would represent population well. For content analysis academic libraries from seven English speaking countries were selected. From full lists of higher institutions in the specific country institutions which organize undergraduate, graduate and doctoral study and have license for giving academic degrees were separated. In order to analyze best practices most representative universities and their academic libraries were selected according to international rankings as Academic Ranking of World Universities (ARWU), QS World University Rankings and The Times Higher Education World University Ranking and national rankings The Compete University Guide (Great Britain), The Guardian (Great Britain), The Sunday Times University Ranking (Great Britain) and U.S. News & World Report College and University rankings (USA). In final sample 366 universities and their libraries were selected: Australia (24), Ireland (7), South Africa (11), Canada (30); New Zealand (7), United States of America (210) and Great Britain (77).

### 3.2. Data gathering

For the purpose of this research a harvester named TOMAHAWK was developed. Starting from library homepage and following each link inside library domain URL address, web page content, metadata, anchor texts and links, and error messages were harvested till fourth hierarchical level in web site's structure and homepage was considered as a first level. Data were harvested in period of April and May 2011. Data were stored in MySQL relational database structured in seven related tables. For managing data from MySQL database was used command window of program Putty and program package

HeidiSQL for Windows platform. Data about 65 570 web pages and 7 655 339 links were gathered. In average web pages consisted 117 links. The most links per web page had libraries from United States of America -131 links while the lowest number of links per web page had libraries from Great Britain -74.

### 3.3. Content analysis

In order to find out presence of library educational services on academic library web sites content analysis of library web sites was performed. Namely, content analysis is research method which objectively, quantitative and systematically describes written, verbal or visual communication [4]. Krippendorff describes content analysis as research method for derivation of repeatable and valid conclusions from text inside its context [12]. With content analysis presence of certain words, phrases or concepts inside text or collection of texts can be determined. Texts could be from books, speeches, interviews, essays, historical documents, advertisements, pictures, videos and recently from web pages. Although content analysis depends strongly upon research questions usually it consists of three steps: sampling, defining unit of analysis and development of categorization scheme. Herring distinguishes the term "web content analysis" for application of content analysis on web environment or (web (content analysis)) from content analysis with use of different traditional and not traditional techniques or ((web content) analysis) [10]. Unit of content analysis in this research was web page of academic library namely text of web page which is visible to users through web browsers. Categorization scheme (taxonomy) was developed by grouping words, phrases and rules describing different educational manifestations inside categories. Since this research was focused on the content describing library educational services only, significant support which academic libraries offer within their learning resources included in library collections and inside their physical spaces for learning and teaching purposes was omitted as content elements.

As mentioned earlier, education is included in many library activities and it was a demanding task to define mutually excluding categories describing library educational services. Preliminary content analysis has been done without use of the categorization scheme to find

out most frequent words and phrases, and selecting those implying educational services for categorization scheme. Finally three categories were defined which describe educational services by different criteria:

1. educational services by carrier – how it is delivered to the user?;
2. educational services by topic – what it is about?;
3. educational services by context – including distance and continuous education.

Concerning method of delivery to the user several subcategories were defined like demonstration, FAQ (Frequently Asked Questions), guide, help, information, instruction, library course, manual, starter kit, support, training and tutorial. Topic category includes subcategories describing most popular topics on which libraries are educating users like information literacy, writing & citing, bibliometry, copyright, plagiarism and information retrieval. By context two main subcategories were selected namely continuous education and distance education reflect major changes in educational processes. Although with certain limitations, these categories give good picture about the presence of educational services in academic libraries.

As a tool for content analysis Provalis software QDA Miner and WordStat were used providing a tool for hierarchical dictionary creation, frequency tables of keywords and content categories and Keyword-In-Context (KWIC) tool which allows one to display the context of specific words, word patterns or phrases.

### 3.4. Research limitations

Academic libraries often offer their content scattered across university web sites which made harvesting harder, partial or impossible. Also, some parts of library web site content cannot be harvested because access is limited to registered users. Not standardized code of web pages and java script or flash technology in some cases caused problems in harvesting.

The analysis taken used simple hierarchical taxonomy and didn't include semantic analysis which will allowed much better matching of the concepts having in mind different terminology librarians are using describing educational services. To avoid possible overlapping with other library services and concepts some

ambiguous words and phrases are purposely omitted from the taxonomy.

#### 4. Interpretation of results

Content analysis was conducted on 65 570 academic library web pages of 366 libraries till fourth level which consisted of 39 500 642 words in total.

8 852 279 stop words which is 22.4% of total words were excluded before analysis. Each web page in average had 610 words.

Generic term "education" is present at 27% library web pages, "learning" (19%) and "teaching" (16%).

Obtained distribution of three main categories of educational services is following: educational services by carrier (94%), educational services by topic (48%) and educational services by context (18%).

Fig. 1. shows educational services by carrier namely the most popular delivery ways of education in academic libraries are help (60%) and support (45%), followed by guide (44%), information (30%), FAQ (29%), different form of questions and answers: how/what/who (28%), training (24%), instruction (21%), tutorial (20%). Libraries are mentioning starter kit (4%) and manual (4%) but for example library course or demonstration not at all.

Fig. 2. shows educational services by topic of library education encompassing topics like writing & citing (40%), information literacy (9%), copyright (8%), information retrieval (6%), plagiarism (5%) and bibliometry (2%).

Education services dealing writing & citing are often related to reference management tools helping scholars to organize, store and use publications of interest.

Among different reference management tools the most present on academic library web pages are commercial reference management tools like RefWorks (15%) and EndNote (8%) while open source reference management tools like Zotero and Mendeley are barely mentioned (0-1%).

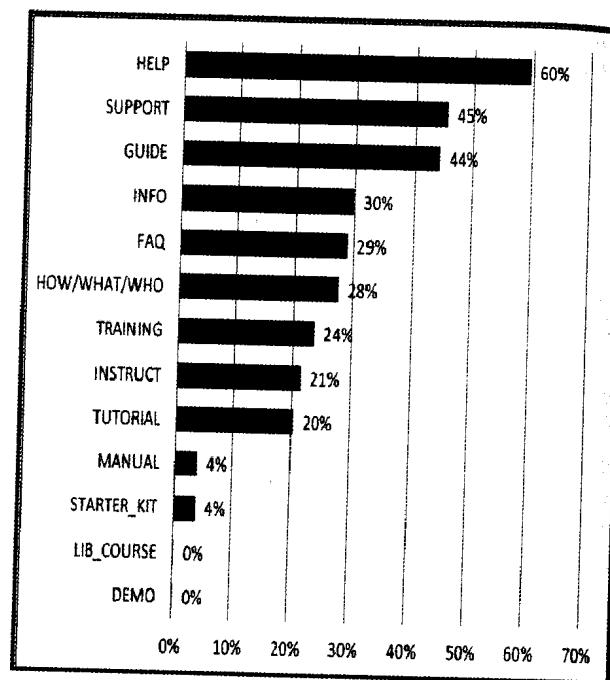


Figure 1. Percentage of educational services by carrier

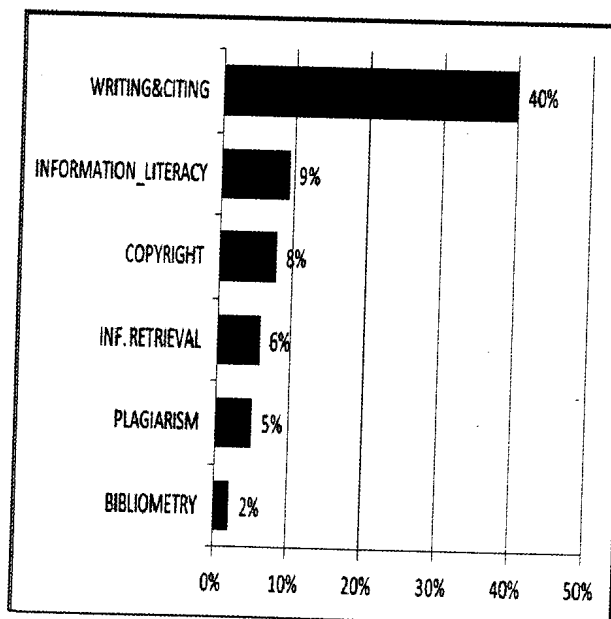
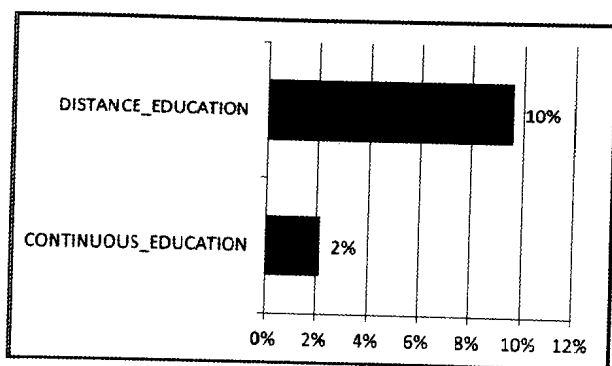


Figure 2. Percentage of educational services by topic

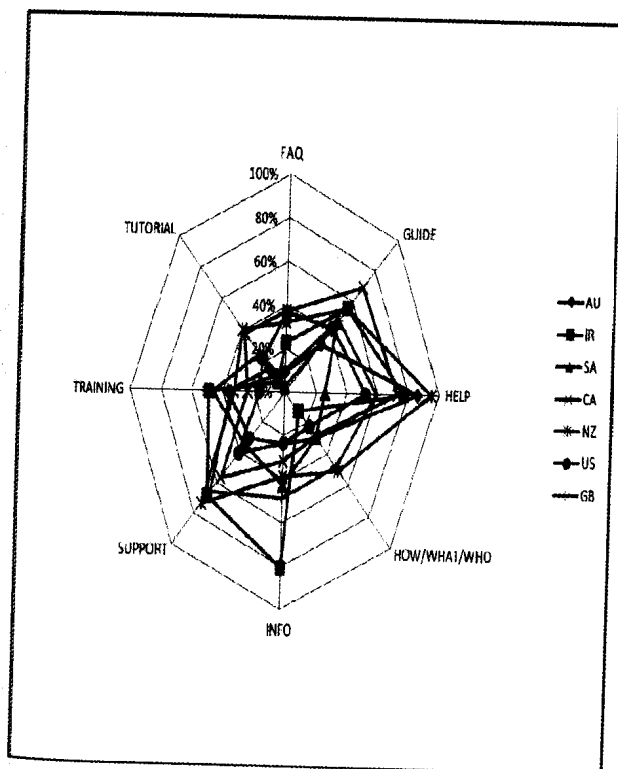
According to the context two main subcategories of educational services namely distance learning and continuous learning are present at 10% and 2% respectively (Fig. 3).



**Figure 3. Percentage of educational services by context**

Relative high distribution of words and/or phrases, inside categories of educational services, within academic library web sites shows that academic libraries recognized their important role in education.

Fig. 4. shows distribution of educational services by carrier across countries. Namely, the most popular carriers for some countries are for example: library guide and tutorial (Canada); library help, support and tutorial (New Zealand); information about, support and training (Ireland).



**Figure 4. Distribution of educational services by carrier across countries**

## 5. Discussion and conclusion

According academic library web pages' content analysis educational services in academic libraries are mostly delivered to their users through different forms of help and support. Also very popular way of educating users is through giving answers to different questions which usually begin with "what?", "why?", "where to?", "who can?" and "how can I?" for example "What is online database?". Furthermore, academic libraries deliver their educational services to users through different guides, "information about", tutorials and through answers on frequently asked questions. Active ways of education through exercises, workshops and seminars etc. are mentioned on academic library web pages in smaller extent. Usual topics are about writing & citing and generally about information literacy. Other educational services are related to information retrieval, copyright and plagiarism. Interestingly, topics about bibliometry (citations, journal metrics, etc.) are not so common on academic library web pages in spite of great popularity of citation databases like Web of Science, Scopus and Google Scholar, and its importance for evaluation of research at universities. Namely, academic libraries should take active role in quality assurance processes at university. Quantitative results about different educational services on academic library web sites in seven English speaking countries well indicate academic libraries' involvement in educational process.

Further research can be oriented towards complete spectrum of library services supporting also access provision, circulation, equipment and facilities provision for students and staff, and information services.

Also, some directions for Croatian academic library web sites based on quantitative results of presence of different services on academic library web sites could be given in order to improve academic libraries' involvement in educational process in Croatia.

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