

# Electronic Library as Modern Information Center

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## Abstract

The article examines current problems of libraries in terms of modern globalized society and transformational processes associated with their transformation into important social institution that performs information and communication functions. It is one of the newest information systems that enables storing and using various collections of electronic documents is the electronic library, which has recently gained wide popularity. The purpose of the article is to analyze functioning of electronic library as a new form of information environment, which enables its transformation into a modern information center of society. Characteristic features of electronic libraries and their components are analyzed; the main objectives of their activity are outlined. Significant projects of the most popular electronic libraries in Ukraine are characterized, including those of “Ukrainika” of Vernadsky National Library of Ukraine, “Ukrainian Culture” of Yaroslav Mudryi National Library of Ukraine, “Historical Heritage of Ukraine” of the National Historical Library of Ukraine, “DIASPORIANA” of Ukrainian diaspora electronic library, and “LIBRARIA” of online library resource of Ukrainian periodicals archives. It is noted that institutions of higher education, along with availability of traditional paper funds, create their own electronic libraries, which not only facilitate searching for necessary information by scientists and students, thus compensating for the lack of necessary textbooks, but also contribute to preservation of the entire library fund.

Thus, the sites of the scientific library of the National Academy of Culture and Arts Management (Kyiv) and scientific and technical library of the National University Yuri Kondratyuk Poltava Polytechnic (Poltava) were analyzed. The important role of electronic libraries under martial law in Ukraine caused by Russian aggression, in terms of access to the library fund, rare and unique documents and their preservation as sights of historical and cultural national memory and humanity in general, was also emphasized.

## Keywords

Library, electronic library, information and communication technologies, information space

## 1. Introduction

Social institutions are undergoing various changes and transformations with society entering the digital era. This process also refers to a library as a social institution that performs information and communication functions in society. Today's realities force libraries to use the latest technologies in their activities, look for the most popular forms of electronic information interaction with their users.

It is worth noting that the main objective of libraries has always been collection, storage, distribution, production and use of publicly available information. For now, libraries should turn information into a

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valuable national potential, on which sustainable development of the entire Ukrainian society may depend.

Within information space development, “process of libraries transformation and their gradual becoming a social institution containing information, communication and cultural components” can be observed [15, p. 83]. It should be noted that all components of the institution's production activity undergo fundamental changes that acquire systemic development: organizational and functional, technical and technological, personnel. Their analysis in modern librarianship depends on transformation processes and reflects horizontal stage of innovative changes that cause only gradual modernization of library activities.

Borys Ye. Paton rightfully referred to libraries as advanced basic unit of informatization, emphasizing that “movement to the information society begins with a network of libraries, because they are the owners of all the information that has been accumulated and made public so far” [11, p.22].

At the current stage of information resources mass integration into the digital space, electronic libraries occupy a special place.

As it is known, beginning of electronic libraries creation was made in the 1960s in the United States of America. Collections of various electronic documents were formed in military, academic and educational organizations, as well as the largest industrial corporations for specific objectives.

In Great Britain creation of EL began in the early 1990s. While the first steps in this process were taken by small groups of specialists, within a few years they acquired status of national programs and international projects. Examples include the project of EL creation for the G8 countries, the “DLI” program in the USA and “eLib” in Great Britain. Note the fact that the number of electronic libraries is increasing every year.

## **2. Historiography**

Analysis of scientific views as for the current state of innovative and transformational changes in the library field, as well as modern theoretical studies on library development strategies identify the lively interest of researchers to this problem.

Thus, the works by O. Onyshchenko, V. Horovyi, T. Hbranchak, V. Ilhanayeva, R. Motulskyi, M. Senchenko, M. Slobodianik, D. Solton, L. Philipova, A. Chachko and others have scientific value for the study of certain issues of libraries functioning.

Scientific works by Ukrainian scientists, in particular L. Dubrovina, I. Matyash, A. Kyrydon are devoted to the role of libraries, archives, and museums as repositories of national cultural heritage, carriers of social memory, as well as forms and advantages of their interaction. The problems of creating an integrated web resource of book sights of Ukraine were considered in the joint work of H. Kovalchuk and K. Lobuzina. Digital library projects, in particular organization of long-term preservation of library electronic resources, first of all, digitized, are considered in the monograph by I. Lobuzin.

Works by I. Dovhalyuk, M. Kuznetsova, N. Kushnarenko, S. Denysenko, S. Shemayeva, and O. Rybachok, where formation of sociocultural environment foundations is analyzed, are also worth paying attention to.

Complex theoretical developments in the field of electronic libraries are most fully considered in the works of L. Dubrovina, K. Lobuzina, I. Lobuzin, O. Mariina, I. Pavlusha, V. Popyk, A. Yatsyshin, O. Antopolskyi and T. Maistrovych.

Ya. Andzhelo, K. Afanasieva, H. Hutsol and I. Davydova made a significant contribution to research of legal aspects of electronic libraries functioning. In the works by S. Klymenko and F. Barker, advantages of modern, developed network of information technology of electronic libraries were studied.

However, despite considerable interest to the issue raised, it remains unresolved and requires systematization of materials developed by researchers in the form of generalizing work.

That is why the purpose of the article is to analyze functioning of electronic library as a new form of information environment, which enables its transformation into a modern information center of society.

## **3. Presentation of the main material**

Prevailing understanding of electronic library (EL) in modern scientific opinion is that it is a distributed information system that enables accumulating, secure storing and effective using of various collections of electronic full-text documents that are available in a user-friendly form through global data transmission networks [10, p. 34]. Specialists note that the term “electronic library” is now used synonymously to such concepts as “digital library” and “virtual library”.

Electronic library is collection of electronic resources and associated technical capabilities for creating, searching and using information [4, p. 48]. It is characterized by dynamism (possibility of updating) and global access (via computer networks).

The main difference between electronic library and other types of information systems is its ability to accumulate and use information in the form of documents [10, p. 44].

The main objectives of the electronic library are integration of information resources and effective navigation within them. Integration of information resources means their unification for the purpose of using different information.

In addition to technical support, functioning of electronic library suggests appropriate organizational, personnel and environmental support, as well as feedback from the user. As a center of publicly available information, it requires users’ advanced computer and information literacy.

For the most part, components of electronic library are electronic collections, digital library, media center and media library.

Currently, electronic libraries have become quite popular in Ukraine.

Generalization of experience of historical and cultural heritage electronic resources formation became the basis for development of the original model and information architecture of the national e-library “Ukrainika” by the Vernadsky National Library of Ukraine (NLU) (Figure 1).

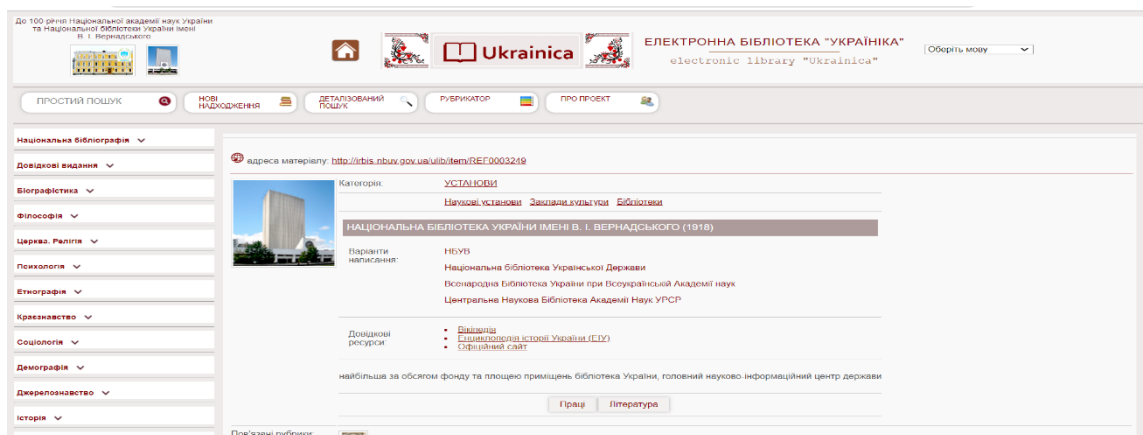


Figure 1: "Ukrainika" electronic library

The project aim is to accumulate in digital format works in all languages, regardless of the place of publication, about the Ukrainian people, territory of Ukraine, and about all peoples who lived or live within its borders. This will provide users of the e-library with knowledge about Ukraine, its people, its history, traditions and culture, developed political nation, state formed by it; materials about the natural, geographical environment, demographic, economic, social, educational, scientific potential of Ukraine, achievements of the Ukrainian nation, its place in the global civilizational development.

The main objectives of the resource are:

1. providing the general public with access to documents of state and national importance;
2. providing users with a single entry point to search for Ukrainian resources of different types and thematic focus;
3. collection and archiving of Ukrainika network electronic resources of (primarily electronic versions of books and periodicals);
4. ensuring preservation of rare library and archival funds of Ukrainika in electronic format;
5. creation of personal, thematic and problem-oriented electronic collections on the basis of e-library resources;
6. popularization of the Ukrainian language and culture, dissemination of Ukrainian literature for Ukrainian-speaking foreign users;

7. creation of opportunities to use e-library funds in scientific research, in educational processes, as well as for the purpose of popularizing the image of Ukraine in the world [7].

The core of the electronic library fund is digitized documents of Ukrainian studies from the collections of the NLU, digital sources of the national heritage (manuscript books, chronicles, Ukrainian old prints, rare editions). In particular, significant information array is creation of electronic resource of the national bibliography of Ukraine: "Book in Ukraine (1861–1917)" and "Ukrainian Book (1798–1923)". Internet resources are included in the unified search system of the e-library together with other electronic documentary information sources.

What distinguishes Ukrainika from other projects is the original system of knowledge organization based on introduction of a unique reference and search engine and accompanying iconographic information. The created reference apparatus is closely connected with other Ukrainian reference web projects: Wikipedia, Encyclopedia of the History of Ukraine (EHU), Internet Encyclopedia of Ukraine (IEU), Encyclopedia of Modern Ukraine (EMU), Ukrainian National Biographical Archive.

E-library also archives and updates valuable free online electronic resources for users in various languages which contain knowledge about Ukraine. Internet resources are included into the unified search system "Ukrainika" together with other electronic documentary information sources. The created webliography gradually forms an Internet navigator of the Ukrainian studies segment of the Internet, and in the future can be a guide for determining the value of Internet resources for archiving and long-term storage [7].

Taking into account the fact that not only the documents content itself is important for researchers, but also accompanying context (temporal, geographical, historical, personal, etc.), "Ukrainika" is accompanied by a unique reference apparatus of structured related data referring to the information field of knowledge about Ukraine. The data of the electronic directory is divided into the following main categories: "Personalities", "Historical events", "Population strata", "Geographic objects", "States", "Peoples", "Localities", "Cultural monuments", "Sights of nature", "Institutions", etc. Each data page contains a unique identifier, a title, an informational image, a category, options for writing the title, information about related data, hyperlinks to reference Internet resources, which together form a searchable image of the concept to which the subject reference corresponds and the documents attributed to it. Thus, there is integration of each separate subject heading into the general system of thematic organization of electronic library "Ukrainika".

That is, there occurs integration of each separate subject heading into a general system of thematic organization of "Ukrainika" electronic library. The main concepts of the presented field of knowledge are accompanied by iconographic and encyclopedic reference information, which makes it possible for each resource to determine its thematic, territorial, temporal and intellectual attributes. Information about availability of relevant works in the electronic library appears automatically for each of the references, information about available reference resources – for each work. A link to the author profile is provided for the author-scientist on the "Science of Ukraine: Access to Knowledge" portal. All these create conditions for researchers to search effectively for sources of scientific information [7].

The materials of the "Ukrainika" e-library have permanent links and identifiers and can serve as sources for relevant articles of Ukrainian Wikipedia articles.

Among the significant electronic libraries, the "Ukrainian Culture" of Yaroslav Mudryi National Library of Ukraine is worth mentioning.

Functioning of the "Ukrainian Culture" EL (Figure 2) is aimed at achieving the following goals: integration of the peoples of Ukraine culture into the European and world information space; strengthening cultural ties and forming a positive image of Ukraine in the world; ensuring equal opportunity for free access of users to the assets of Ukrainian culture and art using the Internet; providing users with qualitatively new opportunities to work with integrated information resource of libraries, museums and other cultural institutions in a single access point; creation of electronic copies of printed documents for preservation of cultural heritage located in the funds of libraries and other cultural institutions and prevention of physical wearing of documents; increasing efficiency of documents usage, disclosure of libraries funds, museums, archives and other cultural institutions on matters of culture and arts; creation of an opportunity to work simultaneously with the same publication for many users [6].

Electronic library is an integrated information system containing:

- fund of electronic resources;

- catalog for electronic resources fund;
- a complex of hardware and software tools that support stable operation of the search system and provide the possibility of prompt replenishment, registration, long-term storage of the electronic library fund and distributed access to it via the Internet.

Fund of this electronic library consists of four collections:

1. History of culture. Theory of culture. Culturology.
2. Art (architecture, sculpture, painting, graphics, decorative and applied arts, music, choreography, theater, cinematography, etc.).
3. Ethnography (peoples of Ukraine, material culture, spiritual culture).
4. Cultural institutions (libraries, museums, archives, cultural and artistic educational institutions, foundations, societies, unions, associations, Ukrainian cultural centers abroad).



Figure 2: Main page of “Ukrainian Culture” EL

It is noteworthy that “Ukrainian Culture” electronic library has its own page on the Facebook social network, which is successfully used to communicate with the target audience (Figure 3).

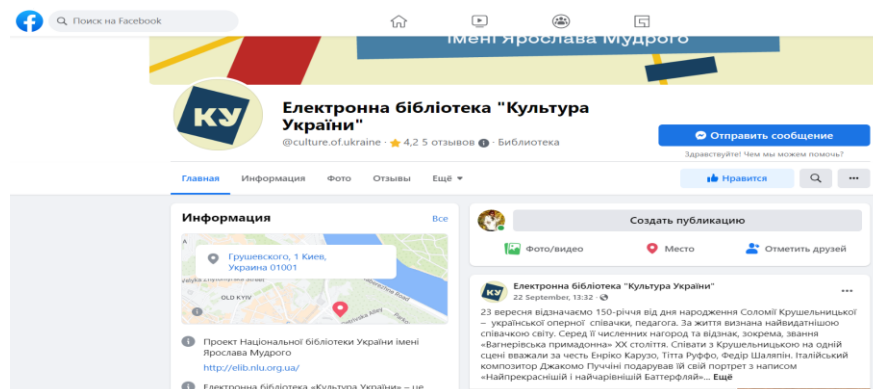


Figure 3: Page of "Ukrainian Culture" electronic library on the Facebook social network

Another interesting and significant project is “DIASPORIANA” Ukrainian diaspora electronic library (Figure 4).

The project is aimed at achieving the following goals: strengthening cultural connections and forming a positive image of Ukraine in the world; ensuring possibility of free access of users to the properties of the Ukrainian emigration using the Internet; creation of electronic copies of printed documents stored in the funds of libraries and other cultural institutions and private collections, in order to preserve intellectual heritage and prevent physical loss of documents; possibility for many users to simultaneously work with the same publication and their ease while viewing [8]. Creating digital copies of rare and valuable emigration documents and publications of different years is one of the priority objectives of this EL. The result of this activity is various documents preservation and provision of free access to them via the Internet for both scientists and anyone interested (Table 1).

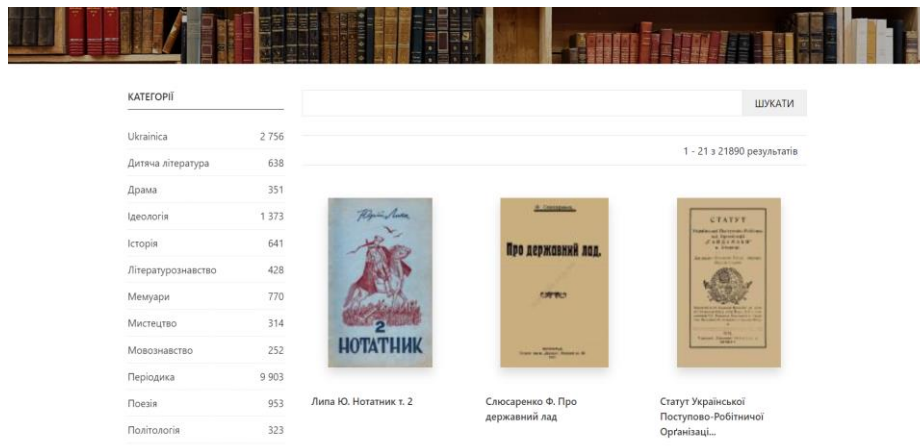


Figure 4: Main page of "DIASPORIANA" electronic library

Table 1

"DIASPORIANA" electronic library funds distribution by categories

Categories of funds	Number of units
Ukrainica	2 756
Children's literature	638
Drama	351
Ideology	1 373
History	641
Periodicals	9 903
Prose	1 434
Religion	744

Analyzing the most famous Ukrainian online library resources, LIBRARIA (Figure 5), which is online archive of Ukrainian periodicals should be mentioned. The project is carried out in cooperation with libraries, archives and scientific institutions in Ukraine and abroad. The goal of the project is to digitize and provide online access to the largest possible array of Ukrainian historical periodicals.



Figure 5: Main page of the LIBRARIA archive of Ukrainian periodicals online

The pages of the LIBRARIA resource include online archive of Ukrainian periodicals, open access to various Ukrainian periodicals that were published throughout the 20th century. The website gives access to recognized texts of the publications with interactive content of each of the numbers, which provides users with extensive search capabilities. Publications presented on the website are divided into thematic collections [2], among which the following should be named:

- propaganda press of the occupied Ukrainian territories 1914-1944;
- daily regional newspapers of the 19th and early 20th centuries;
- Soviet newspapers of the 1920s;

- Jewish interwar periodicals of Halychyna, Volyn, Bukovyna;
- literary and artistic magazines;
- notes of the Shevchenko Scientific Society and others.

Let us note that digitized materials include more than 400 press titles in Ukrainian, Polish, Russian, Yiddish, German, and Crimean Tatar languages and come from the funds of the Scientific Library of Ivan Franko National University of Lviv and the State Archival Service of Ukraine. An important feature of the LIBRARIA project is possibility of integrated search within the texts of publications, since the materials are recognized, with a convenient design and data filtering tools according to various parameters and categories [2].

Electronic library “Historical Heritage of Ukraine” (Figure 6) contains electronic documents, which are rare and valuable publications from the fund of the National Historical Library of Ukraine and is formed according to the principle of profile thematic collections. The National Historical Library of Ukraine is All-Ukrainian depository of historical literature and a methodical center in the field of historical and local history library activities and scientific bibliography on the history of Ukraine.



Figure 6: Home page of the “Historical Heritage of Ukraine” electronic library

The Library fund consists of more than 800,000 storage units [9]. One of the priority areas of the library's work is selection of manuscript books, rare and valuable publications for the State Register of National Cultural Heritage, which is created under the UNESCO “Memory of the World” Program [9].

In the modern information society, libraries play a significantly important role in educational and educational activities. This explains an increase in the number of electronic libraries and electronic catalogs in higher education institutions of Ukraine.

The National University “Yuri Kondratyuk Poltava Polytechnic” (Poltava) also has an electronic library (Figure 7).

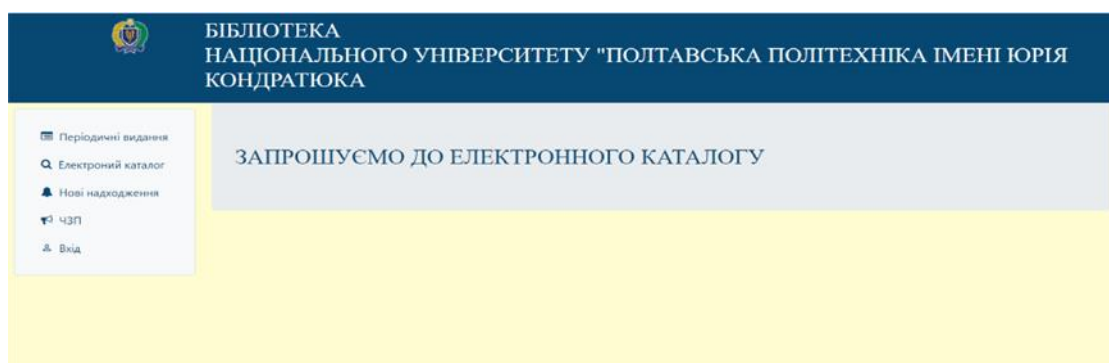


Figure 7: The main page of Scientific and technical library of the National University “Yuri Kondratyuk Poltava Polytechnic

Scientific and technical Library of the university combines all the necessary means and tools for scientific information searching and publishing and provides access to it, namely: electronic catalog,

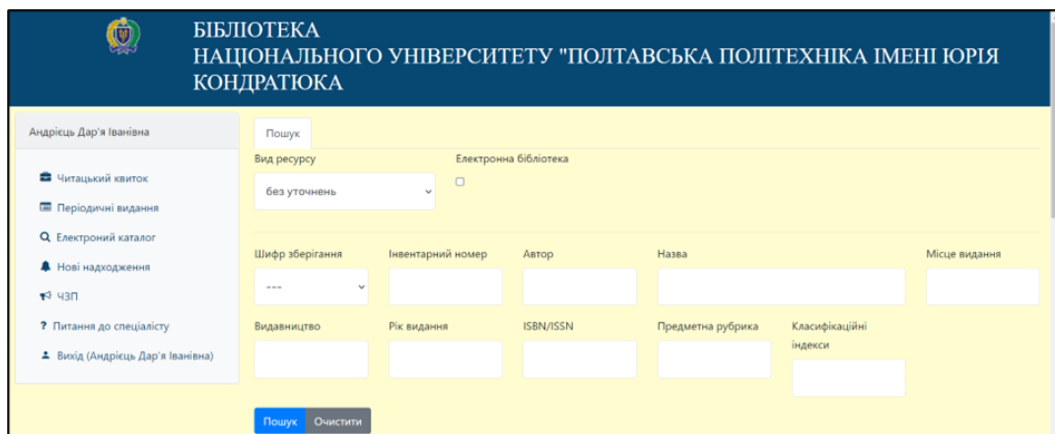
institutional repository, electronic library, full-text purchased and own databases, access to global sources of information (Figure 8).



**Figure 8:** Electronic resources of Poltava Polytechnic STL

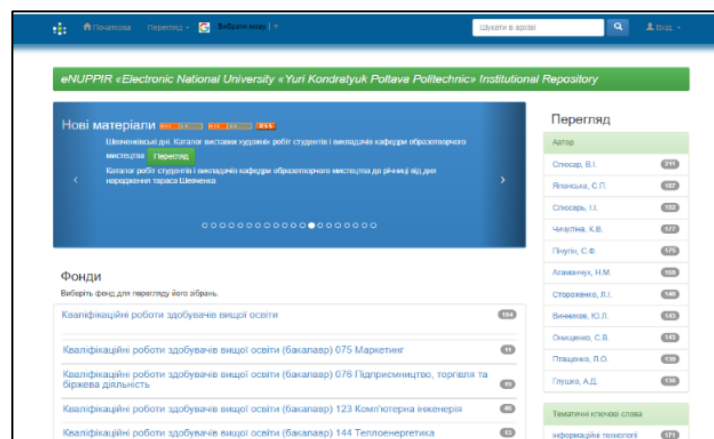
As of 15.12.2022, EL has 5,569 full-text electronic documents, including study guides and lecture notes (639 copies), textbooks (49 copies), methodical recommendations (2,052 copies), and syllabuses of academic disciplines (1,937 copies).

Access to full-text materials of electronic library is provided through STL website, subject to mandatory user authorization. In order to provide users with constant access to STL resources, a temporary on-line version of the electronic catalog was created, placed on website platform of the higher education institution structural unit. Authorized access to the library's web catalog is used here, enabling remote users to access full-text documents of the electronic library. Users may also review their own electronic form for independent control of literature return deadlines, information on the number; availability of documents in departments is provided as well (Figure 9).



**Figure 9:** Parameters of literature search in the electronic library of the Poltava Polytechnic

The electronic library has an institutional repository (Figure 10) which as of February 15, 2023, contained 10425 full-text electronic documents and became a database for information support of educational and scientific processes of the university, for electronic and remoted learning.



**Figure 10:** Main page of the Institutional Repository



The institutional repository provides possibility of storing, systematizing and distributing works in digital form, due to the use of DSpace system. Repository materials are available in public domain without copyright infringement.

It should be emphasized that institutional repository contains various formats of electronic documents, extensions are recommended for their various types (Table 2).

**Table 2**

Recommended materials formats for placement

Material	Name of format	Extension
Text	Adobe PDF, Microsoft Word	pdf, doc
Presentation	Microsoft PowerPoint	ppt
Tables	Microsoft Excel	xls
Image	JPEG, GIF	jpg, gif
Audio	WAV, MP3	wav, mp3
Video	MPEG	mpeg, mpg, mpe

Taking into consideration the university work under martial law in a mixed mode (face-to-face/distance learning), a significant number of services to scientific and pedagogical workers and students of higher education were provided due to other modern means of information technology, mainly through social networks (Facebook, Telegram, Viber), e-mail and mobile connection.

For several years, the Scientific and Technical Library has been using "ABIS" University Library "UnieLibrary" for creation of electronic catalog, electronic library, reader service, information and bibliographic activities the developer of which is Kharkiv Institute of Internal Affairs,.

It is known that ABIS "University Library "UniLib" consists of several modules:

- Collector
  - Literature receipt – all operations of received copies initial accounting are automated.
  - Periodicals – entering data on frequency, price and recipient.
  - Write-off – preparation of write-off acts.
- Accounting books
  - Inventory books – inventory accounting books display information about copies in the usual form.
  - Total accounting books – acts of received literature; acts of written off copies; stock indicators of the fund composition by periods.
- Bibliographer
  - Resource descriptions – analytical description of documents.
  - Linguistic support – alphabetical and subject index, thesaurus, UDC.
  - Editing – correction of documents in the entire database.
- Reader service
  - Registration – creation of an electronic reader's form and its printing.
  - Readers – recording, changing and destroying the form; reader search; re-registration; password change; viewing the form.
  - Organizational structure – hierarchical structure of the university and its divisions.
- Statistics – Automatic, with possible manual input.
- Reference department – enables interacting with the reader in the mode of an administrator's answer to a user's question.
- Additional functions – the system prints its EAN-13 type barcodes for copies and reader tickets.
- Settings – Allows system administration.

All main library processes are carried out in an automated mode, in particular, collection of the fund, scientific processing of documents, informational and bibliographic description of receipts, reader service.

For institutions of higher education, the need to create an electronic library is determined by the need to solve the problem of information insufficiency and preserve the library's information resources

with traditional funds on paper media. Open access to electronic libraries “makes it much easier for users to find the necessary educational and scientific literature, compensates for the lack of necessary textbooks with electronic resources and, most importantly, contributes to the preservation of traditional library fund” [11, p.144]. ELs of universities should become informational core of the institution, basis of educational and pedagogical and scientific processes, a creative laboratory, on resources and services of which the content of education and scientific research largely depends.

#### 4. Conclusions and prospects for further investigations in the given direction

Therefore, under conditions of information society development, a modern library has every chance to exist and occupy key places among sources of information only if the mission of libraries is rethought and its transformation into a center for providing modern information services that will satisfy the needs of society.

In general, the issue of introducing information and communication technologies into library practice, creating own electronic resources and determining trends of their further development has already become a matter of state importance. The latest electronic technologies that came to library institutions gave a tangible boost to all areas of library work. In addition, they made it possible to significantly expand the circle of users outside the library. Moreover, modern computer technology and means of communication make it possible for libraries to reorient themselves economically from the strategy of owning important information resources to providing access to them, which will allow turning the library into a modern information center.

Development of libraries in the network environment involves expanding access to content, promoting it to environment where the user is located. This paradigm reflects a modern view of the changing role of the library as a social and cultural institution.

Digital projects of the leading national libraries of Ukraine are already a valuable archive and resource that provides information sources for culture, science, and education. They perform a role of operational providing a wide audience of users with historical and cultural sources, ensure promotion of a positive image of Ukrainian culture in the world, and form a consolidated insurance fund of digital copies of documents of the national heritage of Ukraine for future generations.

The necessity and importance of electronic libraries was once again proven by the events in Ukraine after the invasion of the Russian Federation. According to the data, as of May 2023, more than 600 libraries were damaged because of hostilities and occupation. That is why creation of electronic libraries enables “preservation and availability of rare and unique documents that are of great importance for the cultural heritage of mankind” [1, p. 50].

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