Environment. Technology. Resources. Rezekne, Latvia
Proceedings of the 15th International Scientific and Practical Conference. Volume II, 325-331

Information and library education in the context of digitalization of society: promising trends and requirements

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Abstract. **This article analyzes world trends and foreign experience in creating a new paradigm in the development of information and library education in the digital era. The necessity of using innovative technologies in bachelor's degree in teaching information and library disciplines, the purpose, teaching methods and results of research are discussed. What, in turn, needs to be done and what will help to train highly qualified specialists for information and library specialists of the republic.**

Keywords: **Digitalization of LIS education, competencies of librarian, information and library education.**

I. INTRODUCTION

The rapidly changing world of digital technologies today places high demands on the information and library community. Will the librarian be able to match and be competitive in today's service delivery market? What knowledge, skills and abilities should he have and what can he offer after receiving higher education? On these and many other questions in the field of improving information and library education in the context of digitalization of society, the following reflections are given.

For educational processes in the era of digital technologies, it is necessary to use not only the previously accumulated, but also breakthrough innovative domestic and international experience. The ongoing reforms in the field of education in our country put forward issues for the information and library community that require non-standard approaches in their solution. When assessing the quality of education, Western European higher education is focused on the overall competence of the graduate? In addition to the general body of knowledge, the concept of competence also includes knowledge of the possible consequences of a particular method of influence, the level of skill and experience in the practical use of knowledge. In the most general approximation, competence can be considered as the ability of a subject to act adequately, in accordance with the conditions of the situation, in the direction of obtaining significant results that have a certain value. This position marks a shift from academic norms of university assessment (knowledge, skills, skills, in fact, internal and closed to the university) to external assessments - the professional and social preparedness of graduates for market conditions. [2]-[3].

In 2009, Tashkent University Information Technologies named after Muhammad Al-Khwarizmi (TUIT), became a member of the international TEMPUS project "New Master's Program in Library and Information Sciences". During the implementation of this project, a number of teachers of the institute and the university had the opportunity to undergo training and professional development in the master's program at Robert Gordon University (Aberdeen, Scotland), one of the teachers received a master's degree in library and information sciences from this university, and a group of teachers took part in the summer schools (Georgia, Armenia, Spain, Italy); new curricula and programs for the master's degree were developed; the methods of teaching information and library disciplines have changed qualitatively; received equipment for educational laboratories [4,5,6]. The program created an opportunity to change, first of all, the idea of the teachers themselves about the educational and methodological process, approaches and methods in their work.

The purpose of research is to improve the training of qualified information and library future specialists based on innovations in digital education (competency-based approach).

The processes of digitalization of classical education - blended learning - should help to master the requirements of this course. Needed to solve the following objectives: increase professional self-esteem; develop skills in working with software (Information and Library Systems (ILS): closed source and open source); develop skills in working with hardware devices (RFID technologies in libraries, computers, printers, robotic scanners, server cabinets, book-readers, SMART book-boxes, digital

Print ISSN 1691-5402
Online ISSN 2256-070X
https://doi.org/10.17770/etr2024vol2.8079

librarians (DL)); meet the requirements for a future library specialist with information and analytical competencies.

In this study were conducted monitoring of academic groups in the undergraduate direction "Library and Information Activities" of TUIT (60 students of the 3rd year and 50 students of the 4th year) showed the effectiveness (about 33% of average scores, about 18% of high scores) of the competency-based approach in the credit-module system education and training of future library specialists in comparison with the traditional (academic) form of education. The data collection tool for this study included the following methods: survey (online questionnaire), observation, analytical and synthetic processing of information [5]. University students were asked to answer questions related to assessing digital competence of the future library specialist, using survey tools Google Form. Online survey data were processed using Microsoft Excel and AI Based Tools. Online survey data were processed using statistical methods to analyze the data, describing percentage frequencies and central tendencies as maximum and minimum.

II. MATERIALS AND METHODS

Having carried out an appropriate study to analyze the current state of information and library education, it is possible to generalize the challenges and problems facing information and library education.

The rapid development of technologies (the Internet, cloud, digital and mobile technologies, social networks), as well as changes taking place in education, affect user expectations and force libraries to develop new resources, services and introduce innovative service services.

In 2011, B. T. Sullivan made a statement that due to the evolution of search engines and the emergence of innovative information carriers, “the academic library is dead” [7]. The author focused on college libraries, citing the following causes of "death":

1. "Physical book collections are outdated." In the author's opinion, the digitized collections of editions made physical collections of books unnecessary. Individual students now pay a subscription fee by contacting any of the major digital book providers for unlimited access to information. Books can be viewed online at any time or downloaded to a portable device. It is noted that some colleges have opted for institutional subscriptions to digital collections, which are now managed by information technology departments, rather than libraries.

2. "Library instructions are no longer needed." To compete with the next generation of search engines, database vendors are forced to create tools that are more user-friendly. As databases have become more intuitive and easier to find information, library instructions for their use are no longer needed.

3. "Information literacy has been fully integrated into the curriculum." Information literacy programs have become part of the general college curriculum.

4. "Libraries and librarians have been replaced by information technology departments." The library buildings have been converted to computer labs, classrooms, and information departments. The evolution of the collection has become a simple matter of maintaining the instructor-recommended database subscriptions. Cataloging has become the exclusive purview of electronic resource providers (who often employ former librarians for this job).

5. "Help desks have disappeared." They have been replaced by ever-improving search engines and social media tools.

6. "The economy has surpassed quality." Some administrators acknowledge that the old model of libraries and the functionality of librarians is producing results that theoretically exceed the results of the new model: personal service, professional research assistance, access to high-quality sources of information. But so, few students take full advantage of this that the services are no longer economically viable. The widespread adoption of Wikipedia and Google Scholar has led to the realization that traditional academic libraries and librarians have become a luxury.

B. T. Sullivan [7] argues that the "death" of the academic library is hailed by many as progress and the logical next step in the evolution of information. However, he notes that the life of an academic library could be saved if a new generation of librarians spent more time creating a realistic path to the future and less time following outdated trends. In contrast to this statement, there are positions of other authors who are more optimistic about the future of libraries. Thus, T.J. Wiebe (2016) [8], when assessing the role of academic libraries in the higher education system, considers that library resources (for example, journals, monographs, books, disciplinary research tools / databases) and services (for example, interlibrary loan, training information literacy) are still critical to maintaining highly effective research environments. At the same time, many researchers insist on the transformation of libraries, the need to set new tasks, the introduction of innovative forms and methods of work (consulting researchers, data processing and dissemination of open data, organization of open access and repositories, etc.), since they believe that traditional indicators and forms of work no longer sufficiently demonstrate the value of the academic library in the digital environment [9], [10], [11]. The results of a study by C. Smith (2015) [12] indicate that public libraries are also under pressure from the external environment - many have closed, the future of others is uncertain. The author cites data showing that the number of public libraries is decreasing, and their visitors are decreasing. Often the reason for this decline is also the digitization of funds. However, the author rightly notes that, firstly, not all physical information is available in digital format, and secondly, libraries play a much more complex role than simply providing storage for books. L. Pedersen (2016) [13] talks about the need to change the direction of libraries and offer library services related to the development of their users' careers and learning.

In the second decade of the XXI century. a wave of projects with the conditional name "The Future of Libraries" was initiated, which were announced by international and national library associations and other interested organizations. First of all, this is a Project of the

International Federation of Library Associations and Institutions (IFLA), in the report on which for 2013 (http://trends.ifla.org) five key trends affecting the information environment are highlighted [14]. In 2017, a report was released [15], which notes that technologies not only greatly facilitated access to information, they also contributed to the creation, publication and dissemination of disinformation, the emergence of "anti-libraries" - huge, apparently authoritative virtual banks of information that can disappear or be changed even faster than they appear. This demonstrates that libraries, as valuable social institutions and infrastructure containing physical collections, are more important than ever. Other trends are also considered, in particular those related to the role of libraries in lifelong learning for adults, 3D printing, etc.

Today it is difficult to predict which technologies emerging in the consumer landscape will be directly related to the training of qualified information and library specialists competitive in the modern labor market. Based on this, it is possible to identify trends in the development of information technologies and try to establish their effectiveness in the strategy of libraries. N. Upadhyay (2015) called for a close monitoring of trends in higher education, information and communication technologies (ICT), information revealing user behavior and social networks [16].

Big data. Research data (Big Data, RD). In an academic setting, researchers store massive collections of data outside the library. These include projects, grant proposals, research notes, research profiles, datasets, experimental results, draft articles, and copies of published articles. Published work, traditionally managed by libraries, is just one direction in the life cycle of all research information. The role of libraries in the formation of institutional data is increasing, as well as in the provision of services for their management (RDM, Research Data Management, research data management) [17, 18, 19]. When asked why librarians should be concerned about big data, N. Upadhyay [16] says that it is because of its prevalence and impact on academic research. Librarians accompanying the research process need to know how big data is used and where it can be found, as well as participate in generating collections of big data that are visible and accessible by creating taxonomies, developing metadata schemas and organizing search methods, and ensure that they are saved for repeated and shared use. This term is associated with the expression "Volume, Velocity, Variety" - the principles on which work with big data is based. This is the amount of information, the speed of its processing and the variety of information stored in the array. Recently, one more principle has been added to the three basic principles - Value, which means the value of information in theoretical or practical terms, which would justify the costs of its storage and processing.

Connected data technologies (Linked Data, LD) are increasingly attracting the attention of the library, despite the fact that the range of communication goes far beyond the capabilities of the individual data available in the library [20]. This technology allows machines to interpret text, place it in context and associate it with appropriate resources, making it possible to work with data from different sources (including the ability to build queries). A number of works and reviews [21, 22] have been published on the advantages and problems of their use in libraries, the possibilities of LD for the identification of authors in catalogs [1], the connection of data for documents stored in digital collections [23], information contained in catalogs with external data sources [22], etc.

Social media and libraries. Interest in social networking technologies continues to grow among librarians as new tools emerge and the number of online users increases. According to a study published by the PEW in 2016, 74% of Americans who use libraries or their mobile applications are social media users [20]. Libraries, especially public ones, are active on Facebook, Twitter and other resources; academic libraries are also increasingly using social media tools to promote services and resources [21], [22], [23].

The Internet of Things (IoT) is a breakthrough technology that brings connectivity to everyday devices. For example, with inexpensive motion sensors, you can find out which library spaces are available or which sections of bookshelves are most in demand [20]. These statistics can be useful in the long term for space planning or budget allocation for stock picking. It is difficult to find any scientific comprehensive research on this topic. The potential of using the technology for libraries is discussed in the article by M. Wojcik [22].

Virtual reality is a powerful tool that allows the user to feel the digital space in three-dimensional, three-dimensional form, navigate the virtual space using helmets, glasses, displays, gloves and other means. Libraries are implementing this trend through the creation of virtual tours of the library using virtual cameras to explore physical space or use for educational purposes. Investing in virtual reality tools and technologies is a way to stay connected with the library's user community [21], [22].

Another direction of computer reality is augmented reality, that is, the provision of additional information for the perception of the real world (for example, textual information indexed by geographic location). The San Francisco Personal Library uses crowdsourcing to find digital images, inviting local history buffs to add virtual information to elements of the real world (city) [19]. Another approach to using augmented reality technology is presented in the article by C. Smith [12]. The author describes a technology in which the location of books in the library is indicated when searching in the catalog, and then the user is directed to this place (providing information about augmented reality for the building or the interior of the library).

Among the generalizing works on the above technologies (virtual and augmented reality, the Internet of Things), we highlight the publication of K. J. Varnum. In his opinion, they may turn out to be fundamental for libraries and users of library services [23].

Technical innovations in libraries. Both to solve internal technological problems and to create service-oriented maintenance technologies, generate their own information products and services, provide access to purchased licensed resources, the library uses various technical and software tools. Developing new directions

in their activities, libraries acquire robots, virtual reality glasses, equipment for organizing innovative creative spaces and rentals (three-dimensional printers and scanners, large-format plotters for interior printing, universal milling machines, oscilloscopes, etc.). The activities of libraries related to digitization involve the use of modern high-speed scanners of various modifications. The article by R. Fuchs [24] describes which scanner is better to buy for solving problems related to the digitization of photographs, books and other documents.

"Electronic librarian", which allows you to read books in the library while outside it - in the office or at home. The robot uses a laser system to move between bookshelves and avoid obstacles. The machine is able to select a book and turn pages, transferring the content to the user's display [14]. The library is the most suitable place for the implementation of robotics, since here the service robots are under the control of librarians. The robot can be asked to bring a book from the shelf. The speech recognition program matches its name with the classification code stored in the database. The robot detects the location of the book using a built-in navigation system with infrared and laser sensors. He can read the titles of books using image and print character recognition [19].

Machine Learning - a class of artificial intelligence methods, a characteristic feature of which is not a direct solution to a problem, but learning in the process of applying solutions to many similar problems. Simply put, machine learning is the process by which computers can be configured to learn for themselves.

Library 4.0 Concept (Library 4.0)

The evolution of Library 4.0 is associated with the development of web technologies (Web 2.0, 3.0, 4.0) [19], changing user preferences and the needs of readers, since a library that can tune itself to the local needs of its community is a library that is most likely, will be considered successful and relevant [9].

Library 4.0 development process. The process of Library 4.0 development:

- intellectual library;
- Makerspace ("do it yourself", that is, bringing an idea to life with the help of modern technology: 3D printers, robotics, equipment for creating video games, e-books, etc. Libraries not only provide expensive equipment and necessary educational literature, but also invite teachers that teach new technologies to be brought to life, such as soft toys with glowing eyes, illuminated clothing, plastic jewelry and 3D-printed toys, and much more;
- context-sensitive technology (Context-Aware Technology). The technology analyzes the user's behavior and interests, makes it possible to adapt the work to changing conditions, that is, the library can recognize the user and provide individual (personalized) services to both new and existing users;
- big data (Big Data);
- open source code, open source software;
- cloud services (Cloud Service);
- augmented reality and modern display;
- librarian 4.0.

The role of librarians will be very important to the implementation of the above; librarian training 4.0 should be a top priority in the future (competency-based approach).

Thus, from the analysis of discussions of this concept in the literature, we can conclude that Library 4.0 in the future will become an intelligent library in which the system itself will analyze information and provide conclusions to users. Now there is only her general vision and individual developments.

Competence can be defined as the ability or set of knowledge, skills and attitudes required for effective behavior and productivity in various cognitive areas; where knowledge refers to having information about something, knowing or understanding something, skill refers to the ability to apply what is known, and attitude refers to a person's mental or emotional approach to something (Khoo, 2005). In the aggregate of competencies, it is individually important to distinguish between professional competences and personal or general ones.

Professional skills are directly related to the operations performed by the professional, such as cataloging, classification, reference, archiving, and so on. Whereas personal or transferable skills are mostly "secret and personal way": how analytical and critical thinking, effective communication, initiative and a responsible soul is one used to carry out these operations. In other words, these are auxiliary skills that interact with professional skills to perform a specific professional job. Related literature shows that different terms such as transferable skills, general skills and alumni abilities, core competencies (Nonthacumjane, 2011; Fisher, Hallam, & Partridge, 2005, p. 43) are used in connection with personal or general competencies.

According to Khoo (2005), the competencies required by librarians and information professionals can be divided into six domains, including:

- IT skills including Internet, Internet and XML technologies, RFID, federated search engines, programming and scripting, productivity tools,
- traditional librarianship skills, which include acquisition, cataloging, classification, indexing, linking, distribution, sources of information, preservation and archiving, copyright and intellectual property laws, user behavior, user needs,
- skills to create value, including research and decision-making skills, knowledge management, user orientation, service orientation, love of learning, intellectual curiosity, interaction with members of the profession, the ability to articulate the roles of libraries and librarians,

- transferable and soft skills, communication, management, leadership, learning and coaching, and teamwork skills, as well as the ability to empathize with users and understand their information needs,
- appropriate attitude, values and personal qualities, flexibility and willingness to solve a wide range of issues, tasks, adaptability and ability to cope with changes, continuous learning, solidarity,
- knowledge in the subject area, subject knowledge in various fields depending on the organization and the position in which he / she works.

Another study (Partridge, Lee and Munroe, 2010) describing librarian skills 2.0. Needed by a new librarian, these skills are grouped into 7 topics: Technology; Training and education; Research or evidence-based practice; Communication (Communication); Collaboration and teamwork; User orientation; Business savvy and personal qualities.

Shared or transferable skills, such as technology skills, information literacy and continuing education, will be aptitude studies, analytical and critical thinking, effective communication, an innovative and proactive soul, teamwork and collaboration, social sensitivity, self-confidence, solidarity, business and negotiation are some of the skills that have not only gained importance in the profession, but they have "changed the direction" of work around the world and have "taken" a place in the professional literature of recent years.

We can easily and obviously say that there are shifts and big changes in the direction of information professionalization in the necessary skills of the librarian. From traditional professional competencies now to skills of a more essential interdisciplinary nature.

Living in an ever-changing world requires adapting professional skills to digital and interdisciplinary skills in order to be part of a "living world" and not a disappearing one. The only constant in LIP characteristics is change itself and the need to constantly update in the developing world. Since the multidisciplinary nature of the LIS field, just like the double helix structure of DNA (Partridge and Hallam, 2004), both professional and transferable skills are the backbone of 21st century LIPs. Obtaining such abilities and competencies would be the main function of LIS schools and it is the responsibility of the LIP he / she also to keep abreast of the latest developments and those willing to learn and strengthen their own competencies; be a "complete" (Audunson, Nordlie & Spangen, 2003) librarian and information professional.

III. Results and discussion

Research suggests that the librarianship market would prefer personal or soft skills such as technology skills, research ability, analytical and critical thinking, and effective communication over professional technical ones. New digital, cultural and economically fast-changing and complex environmental requirements that librarians and information professionals need to be "multi-talented jack of all trades, with high IQ and EQ." (Khoo, 2005), with multiple skills and multitasking (Hashim & Mokhtar, 2012, p. 155). It is not possible to have all of these competencies in order to be an effective LIP, but depending on the type of organization and the location where he / she works, the LIP must be equipped with at least some of them.

The basic professional and personal skills that a new millennium LIP should possess can determine the following: information process; organization, storage, preservation and dissemination of information; sources of information and services; information policy, law and legislation; information (infra) structure, design and architecture; user groups, information needs and their behavior (search) information; development and management of information centers; information literacy and lifelong learning; user training; specialized subject knowledge; promotion and marketing of library services; IT skills for web design; research and professional projects in at least one foreign language.

Along with professional competencies, the LIP should be equipped with such general competencies as:

- see the big picture,
- analytical and critical thinking,
- effective communication skills, soulful teamwork, interaction and collaboration,
- assertiveness, enthusiasm, flexibility,
- recognition of the value of professional interaction and solidarity,
- initiative, self-confidence and responsiveness,
- open to information literacy and continuing education,
- business and negotiation skills,
- ICT skills.

All the necessary materials of TUIT named after Muhammad Al-Khwarizmi: texts of lectures, laboratory and practical tasks, surveys, tests, presentations in the discipline reflected in the educational-methodical complex and Management of the Information System of Higher Education (HEMIS – E-learning_ xn.tuit.uz; lms.tuit.uz).

The result of this scientific research can serve as a systematic work on the development of a draft program for the creation of a competence model of an information and library specialist during the period of digital transformation of society. It is planned to master the teachers and introduce into the educational process, modern innovative educational, information and communication technologies, methods of distance and multimedia information learning, as well as a general change in the scientific and educational environment and the definition of professional competencies in the training of qualified specialists in the information and library sphere [5]:

- the acquisition of special equipment and the creation of educational multimedia laboratories that allow simulating the processes of library

technologies (modeling the entire cycle of creating an electronic library);

- development of new training courses, programs, textbooks and teaching aids for the development of an innovative educational environment that meets the requirements of international educational standards in the areas of bachelor's and master's degrees in the field of library and information science;
- conducting refresher courses for teachers of library and information disciplines and library specialists in Uzbekistan in high-ranking higher educational institutions of foreign countries (on the basis of a magistracy);
- organization of internships for teachers and library specialists in the use of innovative technologies in their activities by the largest foreign libraries (national, academic, university, public);
- conducting training - seminars; summer and winter schools in foreign partner universities;
- organization on a systematic basis of distance learning (e-learning) courses for teachers of library and information disciplines;
- the possibility of training teachers of Uzbekistan to obtain a PhD degree in high-ranking foreign universities for the further development and qualitative growth of scientific and educational potential, both in library and information education, and in other related industries [5,6];
- development and creation of a new direction of bachelor's degree, corresponding to new challenges and requirements of digitalization of society.

This formula is used to analyze the quality assurance of teaching (Q) in universities, which can serve as a guide for the application of this methodology for teaching information and library disciplines in domestic universities [5].

$$Q = K^3 \quad (1)$$

1. Know your students
2. Know your subject
3. Know yourself

The model of professional competence of a teacher can be divided into two main sections: competences and criteria. Competencies can be:- general pedagogical and professional; subject; communicative; managerial; information and communication; reflective; competence in the field of innovation.

And the criteria, in turn, help to specify the requirements for the teacher for each competence.

Analyzing modern trends in the development of information and library services in the developed countries of the world and in Uzbekistan, the following conclusions can be drawn on the requirements for the information and library profession and what actions are necessary for this:

- to preserve the fundamental disciplines that are the basis of the profession and will not change significantly from scientific and technical progress.

These are the disciplines information classification and coding systems, basic knowledge on the formation and acquisition of digital collections libraries, technical studies, bibliography, information and biblio-customer service, etc.;

- to develop disciplines that provide knowledge about modern marketing research methods, image enhancement information and library institutions (ILI) in order to keep their appeal in the age of digital technology;

- to instill the skills of analytical research of information resources, i.e. the modern librarian is actually acquiring the competencies of an information analyst (works with a large number of sources of information, Big Data) and rendered no assistance to researchers in the search for scientific information [6].

Nowadays, in our country, libraries are becoming not only the place of distribution of literature and reading, but also socio-cultural centers, open educational spaces, centers for the development of creative youth, start-ups, coworking centers, etc., based on this, new knowledge is needed on the organization of the work of modern information and library institutions to apply in the educational process of higher educational institutions to maintain their attractiveness in the face of new challenges.

The competence-based approach focuses on the formation of key educational competencies, interpreted as a set of skills, knowledge, normative-value attitudes, necessary for the effective solution of personal and socially significant problems in certain areas of activity and culture.

The study opens up possibilities for modeling the modern image of an information and library specialist, using modern scientific and pedagogical methods and tools.

IV. Conclusions

All this leads to a decrease in the level of teaching efficiency in higher educational institutions, the development of internationalization processes, a decrease in the perception of new knowledge by students and the use of innovative educational and digital technologies.

With the development of digital technologies, librarianship is becoming universal. There is an important shift in the skills and competencies required to effectively manage library collections and services. Traditional professional skills and competencies may have changed in form, but not yet in function and value. A "Complete Librarian" is a professional person who understands library materials and cares about them as content and their physical aspects; organizing and searching for this material; possessing the managerial, institutional and social aspects of the profession and an understanding of the role it can play in society. Librarian of the new era “will become the custodian of digital technologies, information and will be a means of preserving democratic access to information”, who constantly improve information services in response to changing needs. In the

21st century, the LIP has a store of competence full of traditional professional skills as well as basic personal or general skills that interact with each other like DNA spirals.

Much in solving difficult issues of improving information and library education depends on the willingness of the teachers themselves to change, i.e. gain new knowledge, skills and abilities and be ready to transmit them to future library specialists. And this process should be systematic, progressive and continuing throughout life (long life learning). Also, the specific formulation of general and specific competencies should lead to the creation of courses by them that provide these competencies at the exit. These changes in the formation of a new teaching paradigm, in our opinion, will help bring the educational process closer to solving real production problems and increase the competitiveness of graduates of library higher educational institutions in the modern market of intellectual services.

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