

Information and Analytical Competences in the Processes of Intellectual Transformation of Training of Information and Library Specialists

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Abstract—The article analyzes world experience in creating a new paradigm in the development of information and library education in the digital age. It is proposed to use intellectual educational technologies in teaching information and library disciplines, taking into account the analysis of information and analytical competencies, which can change the quality of the process of training highly qualified specialists for information and library institutions of the republic.

Keywords—Information and analytical competence, intellectual educational technologies.

I. INTRODUCTION

In the Concept for the Development of the Higher Education System of the Republic of Uzbekistan until 2030, in the paragraph "Introduction of digital technologies and modern methods into the educational process", in order to introduce digital technologies and modern methods into the educational process, the following activities are proposed: the use of "cloud technologies" in educational processes [1].

The widespread introduction of a system of electronic libraries with the possibility of remote use of them, the expansion of opportunities for continuous improvement of the professional qualifications of students by organizing the use of the library fund and databases after completing their studies at higher educational institutions; acceleration of the creation of national electronic educational resources, organization of work on the translation of foreign electronic educational resources, a gradual increase in the share of electronic resources in the educational process, the creation of electronic educational

literature, as well as a system for placing information on electronic resources in libraries using a QR code in order to download electronic educational literature on mobile devices; creation of an electronic database of scientific and technical information, consisting of materials of conferences, graduation theses, master's and doctoral dissertations of a higher educational institution, the widespread introduction of the use of an anti-plagiarism system in order to preserve the novelty of scientific and technical information in the future, etc.

Purpose of the research. Implementation of intellectual educational technologies in information and library education, taking into account the analysis of information and analytical competence of future specialists.

II. MATERIALS AND METHODS

Methodology of the research. The conducted terminological analysis allowed us to reveal the essence of the information competence of a library specialist - this is a professionally significant personality trait, manifested in the ability to effectively solve social and professional problems using information and communication technologies, improve one's skills in the field of information technology, and adapt professional knowledge to the changing conditions of the information society.

Research methods:

- analysis of pedagogical and specialized literature on the research problem;

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- the method of terminological analysis (for the introduction into the research of the concepts of competence and information-analytical competence, hypothesis, theoretical modeling)

Empirical methods: included and remote observation, individual and group conversations; questionnaires, the method of expert assessments, rating methods, interviewing, testing; pedagogical experiment, including ascertaining, forming and control stages; statistical processing of the results.

As a system, information competence includes tasks, functions, properties, has its own characteristics and structure.

The tasks are:

- enrichment with knowledge and skills from the field of informatics and information and communication technologies;
- development of communicative, intellectual abilities;
- implementation of an interactive dialogue in a single information space.

The functions include:

- normative-legal (indicators of achievements and development; it manifests itself as a system of moral norms, norms of a legal nature, which must be followed in the information society);
- epistemological (aimed at the systematization of knowledge, knowledge of the surrounding reality and self-knowledge by a person of himself);
- communicative (ensuring communication in the information society);
- adaptive (adaptation to the conditions of the information society);
- evaluative (assessment of the significance, usefulness of information, etc.);
- developing (formation of an active life position, independence, self-realization on the basis of a certain system of knowledge and norms adopted in the information society).

Properties have the following properties:

- dualism - the presence of an objective (external assessment of information competence by society) and subjective (internal - self-assessment of one's information competence by an individual) parties;
- relativity - knowledge and knowledge bases quickly become obsolete, so they can be considered as new only in a conditionally defined space-time interval;
- structuredness - each person has his own specially organized knowledge bases,

hierarchically ordered into a certain system of knowledge about information, its types, properties, functions and methods of working with it, using information technologies in professional activities;

- accumulativeness - knowledge and knowledge bases tend to "accumulate" over time; newly incoming knowledge is built into existing arrays;
- selectivity - there is a selection of knowledge according to the principle of usefulness, the possibility of practical use in professional activities;
- dynamism - implies that a specialist does not have a significant amount of knowledge, but the ability to constantly update, update at the right time and use them in the process of professional activity;
- integrativity - manifested in the relationship with the socio-cultural environment of a librarian and the development of society as a whole;
- polyfunctionality - the presence of a variety of subject-specific knowledge bases (the semantic component of knowledge bases is multifunctional) allows you to perform many functions that are a factor in the success of the professional development of a librarian.

The peculiarity is that information competence is manifested in:

- self-renewal, application of new forms and ways of meeting the information needs of subjects, adapting information competence to changing conditions;
- self-development, complication of structural, functional and organizational parameters of the entire system of information competence;
- deepening the specialization of individual elements and the level of their interconnectedness and interaction with each other [5].

Researchers of the Continuing Education Laboratory of the National Research University Higher School of Economics, presented the results of the analysis of Russian and foreign recruiting companies. They compared the requirements that are contained in the vacancies for library specialists from analytical databases. In the US, a librarian is an IT specialist. In the group of digital skills of the competence profile of an American librarian, knowledge of 3D printing, statistics, application testing, Big Data, layout, digital curating, SMM, digital and information literacy.

American employers focus on knowledge-intensive and high-tech skills that affect the main areas of activity of a modern specialist: creating libraries and library systems at the national level, participating in consortiums, and developing global perspectives. There is an increased

demand for competencies related to working with clients, holding events [15].

Many scientists dealt with the problem of formation of competencies and competence of specialists. The works of John Raven, Emeritus Professor at the University of Edinburgh, are widely known in the field of diagnostics and research of competence, its assessment and implementation [10]. Of no less interest are the studies of Lyle and Sine Spencer, who developed methods for assessing competence and predicting the results of the work of specialists based on competencies [12]. Also widely known are the works of Edmund Short, who considered competence as a macro concept and identified four approaches to its decoding [11].

The essence of the intellectualization of the library profession is considered by us as the constant acquisition by specialists of relevant library and information knowledge in the process of study or self-education, as well as in increasing the possibilities for their creative implementation in the professional field. Characterized by effective informational thinking and skills that allow to increase the amount of consumed, processed and qualitatively reproduced information, a modern specialist is focused on improving the quality and comfort of user service [5].

In the work of the library director T.A. Kolesnikova reflected "The concept of intellectualization of the library profession and its implementation at the university." The strategic goal of the library is to be the center of integrated information support for educational and scientific processes, as well as cultural activities of the university. The mission of the library is the most effective, comfortable and high-quality satisfaction of the information needs of university communities in study, scientific research, pedagogical and administrative practice [15].

A number of scientists consider information competence as a component of the professional competence of a specialist, they noted the interdependence of computer literacy and professional competence, defining this interaction as a special information literacy, which is updated at the professional level. Information competence reflects different levels of professionalism of the individual, his professional development as a relatively new socio-cultural phenomenon, which is fixed in the regulatory requirements for a modern specialist [8].

Palkevich O. presented for discussion several incarnations of the librarian of the future: librarian and bibliographer 4.0/5.0, information curator and event architect. The position of a new type of bibliographer includes five key competencies: knowledge engineer, local knowledge environment designer, biblio linguist, info set assembler, knowledge archaeologist plus information curator and event architect.

Korshunov I., in turn, noted that an information and library specialist is: an analyst-synthesizer, a creative information navigator, a specialist in the field of digital

technologies, an instructor in the development of information culture, a manager and marketer in the information and library field, etc.

Based on the analysis of discussions in the literature, it can be concluded that the library of the future should evolve into an innovative, intellectual "Library 4.0." In this model, the system will autonomously analyze information and provide users with actionable insights [9]. The role of information and library specialists will become increasingly critical in achieving this vision. Therefore, training for Librarian 4.0 and 5D bibliographers must be prioritized in the near future, particularly in light of the growing intellectualization of information and communication technologies (ICT) [13].

The evolution of Library 4.0 is closely tied to advancements in web technologies (Web 2.0, 3.0, and 4.0) [14], as well as shifting user preferences and reader needs. A library that can adapt to the specific needs of its local community is more likely to be viewed as successful and relevant [9].

Key Components of Library 4.0 Development

The development of Library 4.0 involves several key processes and features:

Intellectual Library: A system capable of analyzing and synthesizing information to provide users with meaningful conclusions.

Makerspaces: Spaces where users can bring ideas to life using modern technologies such as 3D printers, robotics, video game development tools, e-books, and other creative projects.

Context-Aware Technology: Systems that analyze user behavior and interests, enabling the library to adapt its services to changing conditions. This technology allows libraries to recognize users and offer personalized services to both new and existing patrons.

Big Data: Leveraging large datasets to improve services, understand user needs, and enhance decision-making.

Open Source Software: Utilizing open-source tools and platforms to promote flexibility, collaboration, and innovation.

Cloud Services: Employing cloud-based solutions to enhance accessibility, storage, and sharing of resources.

Augmented Reality and Modern Displays: Integrating advanced technologies like augmented reality and interactive displays to create immersive and engaging user experiences.

Librarian 4.0: A new generation of librarians equipped with advanced skills in ICT, data analysis, and user engagement to support the evolving needs of Library 4.0.[18].

In summary, Library 4.0 represents a transformative shift toward a more intelligent, adaptive, and community-

focused library model, driven by cutting-edge technologies and the expertise of next-generation library professionals [16].

The author of the article, based on foreign experience, his own pedagogical experience, observations, student surveys and interviews with teachers, developed a model and matrix of information and analytical competencies, which included the relevant functional features of Library 4.0. Each lesson, during the research period, was conducted using elements of digital technologies and artificial intelligence tools, which brought attractiveness to conducting theoretical and practical classes, as well as increased the level of perception of educational material by students. The results of the study confirmed our assumptions about the effectiveness of the experimental methodological package in the training of future information and library specialists.

Competence can be defined as the integration of knowledge, skills, and attitudes required for effective performance and productivity across various cognitive domains. In this context, knowledge refers to the possession of information or understanding about a subject, skill pertains to the ability to apply that knowledge in practice, and attitude reflects an individual's mental or emotional approach to a task or situation. Within the broader framework of competencies, it is crucial to distinguish between professional competencies, which are specific to a particular job or field, and personal or general competencies, which are applicable across diverse contexts and areas of life.

From one side, the competencies needed by librarians and information professionals can be categorized into six key domains: IT skills, traditional librarianship skills, skills to create value, including research and decision-making skills, transferable and soft skills, communication, management, leadership, learning and coaching, and teamwork skills, appropriate attitude, values and personal qualities, knowledge in the subject area.

From another, research outlines the essential skills for the modern librarian, often referred to as Librarian 2.0. These skills are grouped into seven themes: technology; training and education; research or evidence-based practice; communication; collaboration and teamwork; user orientation; business savvy and personal qualities.

Both frameworks emphasize a blend of technical expertise, traditional librarianship skills, and interpersonal abilities, reflecting the evolving role of librarians in adapting to technological advancements and user-oriented service.

Professional competencies are directly tied to the tasks and operations performed within a specific profession, such as cataloguing, classification, reference services, archiving, and similar activities. On the other hand, personal or transferable skills are more intrinsic and individual in nature, encompassing abilities such as analytical and critical thinking, effective communication, initiative, and a sense of responsibility. These skills

complement professional competencies and enable individuals to perform their roles more effectively. In essence, they are auxiliary skills that interact with professional expertise to enhance job performance [14].

The literature highlights that personal or general competencies are often referred to using various terms, such as transferable skills, general skills, alumni abilities, or core competencies. These terms emphasize the universal applicability of such skills across different roles and contexts, underscoring their importance in supporting professional success and adaptability.

III. RESULTS AND DISCUSSION

Studies indicate that the librarianship market increasingly values personal or soft skills, such as technological proficiency, research capabilities, analytical and critical thinking, and effective communication, over purely professional or technical skills. In today's rapidly evolving digital, cultural, and economic landscape, librarians and information professionals are expected to be versatile, multitasking individuals with a combination of high IQ and EQ. They must possess a diverse skill set to adapt to complex and dynamic environments, essentially becoming "multi-talented jacks of all trades".

While it may not be feasible for a single individual to master all these competencies, the specific skills required often depend on the type of organization and the context in which the librarian or information professional (LIP) works. To be effective, LIP should be equipped with at least a subset of these skills, tailored to the demands of their role and environment.

In dissertation work [8] proposed an alternative vision of the structure of information competence of a library specialist, which includes three components: cognitive, activity-creative and personal-motivational. The percentage distribution by the number of competencies (20% - cognitive component, 65% - activity-creative, 15% - value-motivational) corresponds to the general principle of practice orientation in the credit-modular system of higher professional education [8].

Monitoring of academic groups in the undergraduate direction "Library and Information Activities" of TUIT named after Muhammad al-Khwarizmi among students in the undergraduate direction "Library and Information Activities" (60-3rd year students and 50-4th year students) showed effectiveness (about 36% of average scores, about 28% of high scores) of the competency-based approach in the credit-module system of education and training of future library specialists compared to the traditional (academic) form of education (about 34% of average scores and about 18% of high scores) added optimism to continue active introduction into the learning path of information - analytical competencies, taking into account the processes of intellectualization of ICT.

Analysis of the results of the survey of undergraduates (sample). Questionnaire Questions:

I. What professional competencies would you like to have:

1. Working with public organizations, attracting extra-budgetary funds and resources (PR management, advertising, fundraising, crowdfunding, outsourcing, etc.) – 18%;

2. The use of Machine Learning methods (ML) in the analytical work of the library – 18%;

3. Preparation and implementation of projects – 17%;

4. Working with Big Data in the library (large amounts of various data that require advanced methods and technologies for their collection, storage, distribution, management and analysis) – 13%;

5. Organization of cultural events – 13%.

II. On what knowledge and skills, to the greatest extent, the effectiveness of library work depends:

1. Organizational skills – 33%;

2. Leveraging Library Innovation – 31%;

3. Communication skills, ability to work in a team – 18%;

4. Using Social Media to Advertise Library Activities – 16%;

5. Working with world information resources – 15%.

III. What professional competencies are most important for a modern librarian?

1. Computer Literacy and Information Literacy – 46%;

2. Ability to navigate in the information space (navigation through information resources) – 33%;

3. Willingness to master and implement innovative technologies – 26%;

4. Ability to apply professional knowledge in practice – 24%;

5. Out of the box thinking, creativity – 24%.

IV. In what areas of the library activity do you need additional knowledge:

1. Application of information technology in the library – 23%;

2. Organization of funds and catalogues – 22%;

3. Information and analytical work – 20%;

4. Library statistics – 14%;

5. Reference and bibliographic work – 12%.

On the other hand, diagnostics of the level of information and analytical competence of library specialists of the city information and library system made it possible to identify problem areas in the constituent components of information competence:

- the results of the analysis of data characterizing the cognitive component suggest that 56% of library specialists have theoretical knowledge at a low level; 28% - at an average level and 12% have knowledge at a high level. A weak theoretical basis for librarians was revealed. It is due to the low number of specialists with vocational education (10% higher and 34% secondary specialized education). A special problem is caused by the normative criterion: 45% of the respondents have a low level of right-wing culture. The survey was conducted voluntarily, anonymously, remotely, however, some employees of the city information and library system refused to take part in the survey, which, in our opinion, indicates some psychological barriers in understanding, studying and working with ICT for acquiring and improving information and analytical competence;

- the data characterizing the activity-creative component indicate that the leading place is occupied by such competence as "ownership of applied software", the interdependence of the development of information competence and the creative component is confirmed (51% of respondents confirmed that the growth of information-analytical competence is accompanied by creativity, creativity in the profession);

- the data characterizing the value-motivational component indicate the presence of two basic motives that stimulate the development of information and analytical competence of a library specialist, taking into account the ICT intellectualization process: "improving my professional level", "increasing my own self-esteem".

Factors contributing to the development of information and analytical competence were also identified (availability of good computer equipment; high level of computer proficiency among colleagues; monetary incentives, i.e., external factors for stimulating activities); hindering the development of information and analytical competence (lack of theoretical knowledge; imperfection of computer technology, the inability to update it in the near future; imperfection of methodological work and lack of advanced training courses and retraining of personnel).

Analysis of the results of the survey of managers and employees of the city information and library system (sample).

I. What professional competencies would you like to have:

1. Consulting users and issuing informational certificates "questions - answers" (in traditional and electronic forms) – 52%;

2. Preparation of book exhibitions, days of information, days of a specialist, benefit of the author, book premiere – 43%;

3. Working with public organizations, attracting extra-budgetary funds and resources (PR management, advertising, fundraising, crowdfunding, outsourcing, etc.) – 40%;

4. Creation of multimedia products (training videos, presentations) – 38%;

5. Use of Machine Learning methods (machine learning) in the analytical work of the library – 36%.

II. On what knowledge and skills, to the greatest extent, the effectiveness of library work depends:

1. Leverage library innovation – 95%;

2. Use of Internet resources – 76%;

3. Leadership qualities – 76%;

4. Communication skills, ability to work in a team – 48%;

5. Using social media to advertise library activities – 48%.

III. What professional competencies are most important for a modern librarian?

1. Computer literacy and information literacy – 95%;

2. Willingness to master and implement innovative technologies – 88%;

3. Ability to apply professional knowledge in practice – 57%;

4. Ability to navigate in the information space (navigation through information resources) – 52%;

5. Out of the box thinking, creativity – 50%.

IV. In what areas of the library activity do you need additional knowledge:

1. Reference and bibliographic work – 74%;

2. Application of information technology in the library – 67%;

3. Forms of cultural and leisure work – 48%;

4. Methodical work – 43%;

5. Organization of funds and catalogues – 43%.

Thus, it can be argued that library and information specialists of a new qualification level are gradually acquiring new competencies. They become experts, consultants on the principles of creation, preservation, distribution, management of electronic information resources (EIR) and technological means.

The research results obtained using the competency-based approach and the Case-study method have shown their viability thanks to the implementation of digital learning tools in the educational process, which can be divided into the following types:

- educational software tools, the methodological purpose of which is to communicate the sum of knowledge and skills of educational and practical activities and ensure the necessary level of assimilation established by feedback implemented by

means of software systems (lms.tuit.uz; xn.tuit.uz);

- software tools - simulators designed for practicing skills, educational activities, self-training, they are usually used when repeating or consolidating previously covered material (ILS: IRBIS, ARMAT++, UzNel, DSpase, Omeka);
- programs designed to monitor the level of mastery of educational material - monitoring software (lms.tuit.uz; xn.tuit.uz);
- information-search, information-reference software tools that provide the ability to select and display the information necessary for the user. Their methodological purpose is to develop skills in systematizing information (analytical platforms Scopus, Web of Science, ProQuest);
- simulation software that provides a certain aspect of reality for studying its main structural or functional characteristics using a certain limited number of ILS parameters;
- modelling software tools of arbitrary composition, providing the learner with the basic elements and types of functions for modelling a certain reality. They are intended to create a model of an object, phenomenon, process or situation for the purpose of studying them, studying ILS;
- demonstration software that provides a visual representation of educational material, visualization of the studied phenomena, processes and relationships between ILS objects;

Before the start of the pedagogical experiment, the academic groups were divided into control (CG) and experimental groups (EG) respondents, who showed the following results: excellent - 12% and 14%, good - 44% and 43%, satisfactory - 36% and 32%, unsatisfactory - 8% and 11%. In the experimental group, a competency-based approach was implemented using the Case-study method.

At the end of the pedagogical experiment, the academic groups showed the following results: excellent - 14% and 21%, good - 48% and 52%, satisfactory - 32% and 25%, unsatisfactory - 6% and 2%.

Students have increased interest in digital educational technologies and understanding of the need to acquire new competencies for future professional activities.

Instructional Design. The main emphasis in pedagogical design was on the use of information and communication competencies and the development of future library specialists' professional interest in innovations of digital technologies in the educational process (multimedia resources, collaborative navigation and design, work with analytical platforms, work with automated library and information systems (LIS)), work with educational platforms (moodle.tuit.uz, lms.tuit.uz,

xn.tuit.uz), work with distance learning tools, development of an industry digital library, etc.).

An example of one lesson. During the start of the design, students completed a survey (google.doc), where they showed the level of awareness about information and communication technologies used in libraries and the information and analytical competence required by a modern library specialist.

After this, training in the subject "Information and Analytical Products and Services" was offered using the Case-study method (Case: Scopus is considered by many to be the main competitor of the Web of Science database for citation analysis and journal ranking statistics. The Scopus website states, that the database is "the largest abstract and reference database of peer-reviewed literature and quality web sources using intelligent tools to track, analyze and visualize research." It has more international coverage than web science, and the Scopus interface is simple and intuitive). Next comes the introduction and study of the case by students using information and reference resources. The teacher advises students working in small groups using digital analytical platforms Scopus and WoS, an electronic board, a computer and tablets. Then there is a discussion of the optimality criteria for the proposed options (projector, electronic board). The final part of the lesson: presentation of each group's case (computer, tablets, smartphones, electronic board), tests on the subject and test results (lms.tuit.uz, google.doc, Kahoot).

Innovations in development:

- application of blended learning in the educational process in the training of library personnel using ILS;
- using the Case-study method with digital learning innovations (Zoom, Kahoot, ILS, platforms: Scopus, WoS, Springer);
- development of cases based on real professional scenarios using intelligent ICT

Problems that were solved:

- students' cognitive interest in innovative digital teaching methods has increased,
- the psychological barrier when working with digital technologies was overcome, new knowledge and skills were acquired in using software and hardware devices in the educational process,
- a number of digital innovative technologies used in real library practice have been implemented into the educational process (development of joint Biblio-Pro projects, technologies of the Library 4.0 concept, electronic cataloguing, work with cloud technologies, RFID technologies in libraries).

Current status and general planning of the project:

- currently the preparation of educational and methodological materials, software,

databases for working conditions in Smart Class is underway;

- the experience of innovative work is expanding for the use of intelligent ICT in other educational subjects;
- an analysis of the lessons conducted is carried out for further dissemination of this experience to other courses;
- development of a new ILS with elements of intellectualization of data search in databases is underway;
- the possibility of using the Case-study method using digital technologies for advanced training courses for library workers is being considered.
- Project implementation timeline:
- preparation of syllabuses for courses - 1 month;
- preparation of cases of laboratory work using ILS - 3-4 months;
- preparation of practical training cases using ILS – 3-4 months;
- development and preparation of a textbook and teaching aid for the courses: "Information and analytical products and services" (in Uzbek, undergraduate); "World Information Resources" (in Uzbek, master's degree) – 3-4 years per unit;
- analysis of results – 1 month;
- reports – 1 month.
- The uniqueness of digital technologies and key features of the project:
- use of ILS for students to simulate real production situations in the classroom - cases (with open and closed code);
- the opportunity for students to remotely create electronic resources (electronic libraries, electronic catalogs, full-text information databases, etc.);
- studying a special course based on the Case-study method using digital systems of learning process controllers and intelligent ICT (lms.tuit.uz, xn.tuit.uz, ILS, Kahoot);
- overcoming the psychological barrier among students and teachers in using digital learning tools in the classroom;
- increasing the qualification level of digital competence of teachers;
- quick adaptation of graduates to real work in information and library institutions;
- final qualification work is carried out on a specific production base and using digital technologies (ILS: with open and closed codes).

Summing up the preliminary results of the conducted research, we can state the following: the use of an educational experimental methodological complex in the educational process has improved the quality of the educational process and the final scores based on the

results of student testing. This may later affect the process of improving information and analytical competence and the general training of highly qualified information and library specialists.

IV. CONCLUSIONS

In foreign libraries, there is currently a tendency to single out information learning as an independent direction. You can even see it in the job titles. So, employees who are directly involved in the reference service in the "request-response" mode are called "reference librarians", and employees who train users are "educators". And if earlier informational training of users to search for information was mainly characteristic of academic libraries (university libraries), where it was integrated into training programs as independent courses, now the range of libraries offering training services is expanding, for example, due to public libraries.

At present, the need for user training is determined not only by well-known factors (the educational mission of libraries, the need for users to adapt to the information environment, the obligatory library orientation and bibliographic training), but also by general trends in the development of the information society.

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