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**Serhii M. Pryima**

Doctor of Pedagogical Sciences, Associate Professor, Professor at the Department of Computer Science  
Tavria State Agrotechnological University, Melitopol, Zaporizhia region, Ukraine,  
ORCID 0000-0002-2654-5610  
*pryima.serhii@gmail.com*

**Olena V. Anishchenko**

Doctor of Pedagogical Sciences, Professor, Head of the Department of Andragogy  
Institute of Pedagogical Education and Adult Education of NAES of Ukraine, Kyiv, Ukraine  
ORCID 0000-0002-6145-2321  
*anishchenko\_olena@ukr.net*

**Yuan Dayong**

PhD, Senior Researcher & Deputy Director  
Institute for Lifelong Learning and ESD at Beijing Academy of Educational Sciences, China  
ORCID 0000-0002-9887-9257  
*yuandayong@bjaes.cn*

**Nataliia A. Ivanova**

Doctor of Philosophy research scholar  
Bohdan Khmelnytsky Melitopol State Pedagogical University, Melitopol, Zaporizhia region, Ukraine  
ORCID 0000-0003-3309-2813  
*ivanova1977@gmail.com*

## **FORMATION OF THE PROJECT COMPETENCE OF FUTURE SPECIALISTS IN INFORMATION, LIBRARY AND ARCHIVE SERVICES IN A DIGITAL SOCIETY**

**Abstract.** The article substantiates the importance of forming the project competence of future specialists in information, library and archive services with the help of the project management information systems. The essence of project development in the library sphere is specified. The key features of the project activity of specialists in information, library and archive services under the conditions of digitalization, as well as the specifics of its informatization, are analyzed. The special features of project management as a component of library management are described. Some project management information systems are characterized. The structure of library workers' project competence (value-motivational (axiological), knowledge-content (cognitive), technological (activity-practical) components) is specified. The value-motivational component is determined by a set of stable motives (personal, cognitive, professional ones) and suggests a conscious positive attitude to the project activity automation, readiness for its implementation. The knowledge-content component assumes having knowledge of the project activity automation. The technological component includes the ability to perform the project activity automation, to feel free in the information environment, etc. The results of the experimental verification of the efficiency of pedagogical conditions in order to form the project competence of future specialists in information, library and archive services (illustrated by the implementation of the author's special course "Information Systems for Project Management in the Professional Activities of Information, Library and Archive Specialists") are presented. The implementation of the author's special course has visualized certain positive changes in the levels of the project competence development of students in experimental groups compared with those in control ones. The results of the obtained data analysis made it possible to ascertain the positive dynamics of changes in the quantitative indicators of the levels of the project competence development of future specialists in librarianship.

**Key words:** digitalization; specialists in information, library and archive services; project competence; project development; project management; methods and means of project management; project management information systems.

## 1. INTRODUCTION

**Formulation of the problem.** With the development of knowledge society and digital economy, libraries play a leading role in systematizing and disseminating numerous printed and electronic information resources to meet the information needs of users – children, different categories of youth and adults. Shifting the emphasis in the activities of libraries contributes to turning them into multifunctional centers which provide access to digital resources, and into institutions for information support. In this context, the project activity of libraries becomes an integral part of their innovation development and, at the same time, the driver of professional growth of information, library and archive specialists.

The transformation of libraries into multifunctional social and cultural institutions has become a feature of the global trend, which is, in particular, visualized in both international documents (Lyon Declaration on Access to Information and Development (2014) [28], the framework program of the European Commission on Creative Europe (2014 – 2020) [26], Strategic Plan 2016 – 2021 (IFLA) [23], Global Vision: Summary Report, 10 Key Findings and Opportunities (IFLA, 2018) and national ones (Strategy for the librarianship development for the period up to 2025 "Qualitative Changes in Libraries for the Sustainable Development of Ukraine" (2016) [24], the ULA Manifesto "Libraries in Crisis" (2015).

We would like to emphasize that the Strategy for the librarianship development for the period up to 2025 focuses attention on the extremely important role of libraries in "developing the information and linguistic culture of society...". In this document, libraries are recognized as "the basic element of the cultural, scientific, educational, information infrastructure of the state". It should be added that the activities of cultural institutions can now be considered in the context of creative industries as a type of economic activity [7]. Regional strategies have been developed, aimed, in particular, at improving the quality of cultural services, direct involvement in the formation of a creative cultural environment and in the activities of all community residents. Fundraising, project and personnel management, advocacy, social partnership practices, etc. are gradually spreading in the library sphere.

The development of the knowledge society, actualization of the social functions of libraries, and expansion of the boundaries of regional, national and international information interaction lead to the need to revise the requirements for the library industry in general and, in particular, for training such specialists in information, library and archive services who will be capable of navigating in a multidimensional information space.

At the present stage of education development, future specialists' training in information, library and archive services is provided at vocational schools, colleges of culture and arts, academies and universities. The "National Strategy for Education Development in Ukraine up to 2021" [17], Strategy for the librarianship development for the period up to 2025 "Qualitative Changes in Libraries for the Sustainable Development of Ukraine" [28] and other documents emphasize the need to direct the structure and content of library science in higher education towards the needs of the individual and the requirements of the labour market, the urgency to provide cultural institutions with competitive staff.

Professional activity in any branch of economy under the conditions of digitalization requires having highly skilled personnel capable of innovation, development of general and informational culture of users in order to overcome information inequality, etc. Under such conditions, vocational education institutions should train specialists capable of adapting to the conditions of innovative transformations in the information society, and using new technologies for the implementation of their ideas in professional activities.

The relevance and importance of our research in the field of professional training of specialists in information, library and archive services is determined by the need to resolve a number of contradictions and problems, among which:

- discrepancies between the state of librarianship in Ukraine, the pace and depth of transformations and the needs of library users, society and the state;
- lagging of library specialists' professional training behind the current requirements of the labour market (without taking into account the needs of the individual, the interests of the state, territorial communities and employers), the overall level of information technology development and the needs of libraries;
- discrepancies between the scientific substantiation of the content and mechanisms of information technologies use for increasing the project activity effectiveness of specialists in information, library and archive services and the requirements for these specialists' professional competence in the field of project activity.

Taking into account the above, the development of procedural-activity algorithm to form the project competence of information, library and archive services specialists in the course of professional training on the basis of project and information technologies integration, is seen as a relevant scientific task.

**Analysis of recent research and publications.** For our study, it is important to refer to the research works, which substantiate and reveal the leading provisions with regard to: innovative processes in the work of libraries (Bashun O. [3], Voskoboinikova-Huzieva O. [5], Davydova I. [6], Khimich Ya. O. [3], etc.); project activity as a component of the library development and librarians' professional growth (Bilous V. [4], Lobanovska I. [14] etc.); project management in the field of information and library activity (Zlotnikova Z. [8], Kraplych R. [13] etc.); professional competence of information, library and archive services specialists (Ivanova N. [10], Zozulia S. [9], Kunanets N. [19], Rzhеusky A. [19 ] etc.); features of training specialists in information, library and archive services, improvement of library and information education (Serbin O. [20], Sydorenko A. [21] etc.).

Our research gives grounds to conclude that in the national scientific literature there has yet been no research on the system of formation and development of the project competence of future specialists in information, library and archive services under the conditions of a digital society, which testifies to the relevance and feasibility of such research.

**The purpose of the article** is to scientifically substantiate the system of forming project competence of future specialists in information, library and archive services with the help of project management information systems; to experimentally verify the effectiveness of the pedagogical conditions for the formation of project competence of future specialists in information, library and archive services on the basis of the project and information technologies integration in the course of vocational training (illustrated by the introduction of an integrated special course "Information Systems for Project Management in the Professional Activity of Information, Library and Archive Services Specialists").

## 2. THEORETICAL FRAMEWORK OF THE RESEARCH

### 2.1. Project activity of information, library and archive services specialists under the conditions of a digital society.

Information and library activity, as one of the components of cultural activity, is aimed at "the creation, replication, distribution, demonstration, promotion, preservation and use of cultural goods and cultural values to meet the cultural needs of citizens" (Article 1 of the Law of Ukraine "On Culture") [7]. At the same time, the modernization of the library services has updated the need for the project activity as an integral part of it, since an increase in the number of projects that have been implemented at different levels serves an indicator of positive dynamics in the activities of libraries.

The study of scientific sources indicates the diversity of approaches to the interpretation of project activity in the library sector. Here are the most common of them. So, the project activity in the library sector is: a prerequisite for the innovative development of the library, a means for the development of social partnership (Tarasenko N.); the method of purposeful cultural changes (Bolshakov A.); the mechanism of the region's cultural policy realization (Bulavina D.); the factor of the region's socio-cultural environment formation (Zlotnikova Z.); the way of organizing, identifying and increasing the resource potential of the cultural sphere (Galkina O.); a specific form of socio-cultural processes regulation (Kuleshnyk O., Sokolova D.); organizational and management form of cultural activity (Zinevych V.); stage-by-stage effective implementation of the conceived idea in certain terms with the use of optimal means and resources (Prytuliak T.); a means of lobbying and advocacy in promoting socially significant library projects (Mazhara L.); a tool for the formation of librarians' professional competence (Bilous V.).

The project development in the library sector is characterized by certain features. In the context of our research, based on the research outcomes [8], the most important of these are: 1) taking into account the needs of the population in the development and implementation of socio-cultural programs and projects; 2) inter-industry interaction of specialists in the course of the project decisions development; 3) justification of the project management mechanism in the library management system. At the same time, library practice pursues the principles of project development, especially the principle of relevance and problemat�icity, which is justified by the targeted financing of individual programs and projects. Excessive interest in programming beyond the scope of scientific justification might do harm both to the theory and practice of project development in the field of librarianship.

We emphasize that the analysis of research in the field of theory and practice of project development allows considering the project activity in the conditions of libraries as a system, through which organic and efficient use of projects for changes in education, culture, and social sphere is ensured. Consequently, the project activity of specialists in information, library and archive services is considered by us as a multifunctional activity, which contributes to the more precise formulation of the cultural activity goals, achieving the balance between importance and effectiveness in the cultural activity, justification of the resources involved (personnel, information, material and technical, financial, etc. ), overcoming the costly method of culture financing, improving the quality of services provided in the cultural sphere, stimulating creativity in the search for new solutions.

To study the problems of organization, implementation of project activity and making appropriate decisions, different steps, phases, stages of development and implementation of the project are combined into the life cycle of the project. The life cycle of the project involves certain stages: initiation, planning, execution, control, analysis (often "control" and "analysis" are combined into "monitoring") and the completion of the project. Understanding these stages is important both for professional training of information, library and archive services specialists, and for the selection of information technologies to ensure the effectiveness of project activity.

We agree with the statement of Zlotnikova Z. [8] that despite the high effectiveness that the practice of using the project management system proves, today's project development in the library services has in many ways acquired some spontaneity due to the lack of methodological and technological justification. Very often the project activity of libraries is limited to its separate elements, and it is carried out by outdated standards and organizational schemes. At the same time, application of the project management methodology in the library services, unlike manufacturing and commercial organizations, requires the development of new methods and tools. Such development should be realized on the grounds of complex interdisciplinary research.

## **2.2. Project management as a part of library management.**

Project management and digitalization in the library sector should serve the basis for innovative developments both in the information and library activities of institutions and in the professional training of information, library and archive services specialists. It is project management that offers broad opportunities for the participation of libraries in the development of the community's socio-cultural environment.

Project management as a priority direction ensuring the efficiency of modern library management involves the development of a methodology for the organization, planning, coordination of library and information resources during the project cycle, aimed at achieving its goals. Library project technologies are closely linked to the organizational, research, and managerial processes taking place in the socio-cultural environment of the region [8]. Thus, the project management uses the program-target, system and other approaches to achieve the results defined in the project (by composition, scope of work, time, cost, and quality). In the context of ensuring the effectiveness of the project activity of libraries, it is the organizational approach that deserves attention, since it is the flexibility of management that is one of the important conditions for ensuring its effectiveness. The results of the analysis [18, p. 13–14] indicate that to ensure the project activity of libraries the organizational approach involves the introduction of appropriate technologies and techniques for the purpose of working out the algorithm of library project activity, studying and analyzing the contents of the library work – with a view to choose the theme of the project and the form of work on it, and modeling the optimal composition of the library's fund for information support of the project activity, as well as automation of all its stages.

Analysis of research materials provides grounds for the conclusion that the main tasks of project management in the library services are: the development of effective planning models and flexible organizational structures that provide the library with strategic positions and a high level of adaptation to any changes; the development of non-commercial marketing, which allows the library to achieve a significant social effect; development of methodological work, based on the principles of innovative management; development of the mechanism of personnel management, etc. According to Zlotnikova Z. [8], the most relevant areas for developing activities on the use of methods and tools for project management in library activities are: the use of existing methods and tools for project management; adaptation and development of existing developments to the key features of the national librarianship; development of new methods and tools for project management.

## **2.3. Informatization of the project activity of library specialists under the conditions of knowledge society development.**

The professional activity of information, library and archive services specialists involves solving various tasks related to the search, selection and processing of information [11] and requires different knowledge, skills and competences. The ability to use digital technologies becomes an integral part of professional activity in any field [27], [29]. At the same time, digitalization should promote the development of the information society and media, social, cultural and economic development, as well as the strengthening of the information society and democracy in general [12]. Unfortunately, in the professional training of future library specialists that is provided at national higher education institutions little attention is paid to the development of skills for using modern information technologies in the professional activities [30, p. 16].

The development of informatization, information technologies is the basis for developing a methodology for project management in library services focused on solving a wide range of problems. Undoubtedly, the effectiveness of the project activity can be

achieved on condition that it is provided with information resources and technologies, as well as with appropriate means of informatization. IT project management solutions focus on information support for project, program and project portfolio management, which ensures a certain set of functions and efficiency of use by all actors in the project activity. We consider it necessary to emphasize that the most complicated is not the actual informatization of the project activity as a process, but a peculiar "deficit" of information that was formed under the current conditions of library activities. Under such conditions, it is extremely important to organize the process of accumulation and dissemination, together with popularization of the relevant experience.

Project Management Information Systems (hereinafter referred to as PMIS) imply the availability of appropriate regulatory framework for project management processes that define their functions and powers, including the necessary tools in the form of templates, techniques, etc. PMIS is a key tool used to collect, accumulate, analyze, process and prepare information on projects or programs which gives grounds for the project activity subjects to make managing decisions.

Effective organization of the project activity is carried out with the use of special sets of applications. The most widely-used sets of scheduling-resource planning are Microsoft Project, Primavera Project Planner, Open Plan Professional, Spider Project, Building Manager, etc.

In addition to the desktop version of the PMIS, the "cloud" project management information systems are becoming more and more popular. The "cloud" PMIS are used for organization of a project-oriented portal environment – a virtual project office, whose distributed computer system allows you to use the same software tools, unified databases and knowledge bases on the basis of telecommunication networks. Such electronic communication tools like video conferences, telecommunication meetings can provide direct communication between the project team members / or project management members. In the real time mode, it is possible to start communications in such variants as "time-place":

- "the same time – a different place" (e-mail, fax messages, when team members cannot get together, because they work in geographically remote places; not only telephone conferences, but also video conferences are held);
- "different time – the same place" (the project team / project management team includes those members who work under different working hours, and applies voicemail and e-mail, thus reducing the number of face-to-face meetings);
- "different time – different place" (project team members / project management members, for whom it is difficult to meet at one time and in one place, register in the system, find out what has been received since the last inspection, write down the messages and exit the system).

Of these "cloud" PMISs, Bitrix 24, MegaPlan and others have become widespread.

The paper [2] outlines the main criteria and characteristics that ought to be taken into account when selecting software for project management.

Note that when choosing the PMIS to learn the specifics of project management in the field of library activity, it is necessary to distinguish the variables that reflect the specifics of this particular activity. This is the possibility to work in different browsers, and the availability of the free version of the PMIS, and the system support. Among the PMISs that most respond to the specifics of the library activity, we could single out Bitrix24.

Bitrix24 has a mechanism for setting tasks and monitoring their implementation. Each performer can more effectively build his/her work and interact with colleagues. Tasks can be put on your own, you can take them from the project manager, delegate them to your colleagues. Available project management tools allow you to take into account the time and

other resources to meet specific project objectives. Visualization of project tasks takes place in the form of a Gantt chart, which clearly shows the time boundaries of each task.

Table 1.

**Comparative characteristics of the PMIS for project management in the field of library activity (compiled by [2])**

№	Function	MS Project	Spider Project	Building Manager	Open Plan	1C: Project office management	Bitrix 24	Mega Plan
1.	Automated formation of the activities list and their physical volumes (cooperative work on the program of technical documentation development )	-	-	+	-	-	-	-
2.	Formation of the work calendar execution schedules, financing	+	+	+	+	+	+	+
3.	Prompt introduction of actually executed volumes of work, supplies, financing with recalculation of planned indicators	-	-	+	-	-	-	-
4.	Import / export of data from one system to another	+/-	+/-	+	+/-	+/-	+/-	+/-
5.	3D visualization of the calendar plan	-	-	+	-	-	-	-
6.	Multi-project management	+	+	+	+	+	+	+

**2.4. Project competence as a component of the professional competence of information, library and archive services specialists.**

In [12], it has been stressed that human capital is the driving force behind the digital economy. First of all we are talking about knowledge, talents, skills, abilities, experience, and intelligence of people. Therefore, training in general and professional digital competences and knowledge is a priority task on the way to accelerated development of the digital economy.

The assessment of the professional qualities of information, library and archive services specialists is carried out on the basis of different approaches, among which the competence approach takes the leading place. According to [16], [22], competence is interpreted as "a person's ability to perform a certain type of activity, which is expressed through knowledge, understanding, skills, values, other personal qualities"; "dynamic combination of knowledge,

abilities, skills, ways of thinking, views, values, other personal qualities, which determines the ability of a person to successfully socialize, carry out professional and / or further educational activities".

In the guideline documents on higher education standards [15] three competences are identified in the list of the graduate's competences: integral, general and special (professional, subject). In particular, professional competence represents an integrative personal entity, the formation of which is based on certain knowledge, skills and abilities, significant personal qualities and life experience which determine the readiness of a specialist to perform specific activities and provide a high level of self-organization.

Let us note that one of the components of the professional competence of information, library and archive services specialists is the project competence, which is determined by the organizational and content specific nature of the project activity. It provides content and functional components of professional communication and serves as a prerequisite for successful professional activities. The project competence of a specialist in the information and library sphere should be considered as an integral characteristic of the professional competence, a component of professionalism, which is the basis of personal and professional growth. According to [10], project competence as an integrative unity of intellectual components, personal characteristics and experience, expressed in the ability and readiness for successful independent development and implementation of projects in professional activities, allows you to use your own potential, quickly and successfully adapt to diverse tasks under the conditions of social practice that is constantly changing. Under the conditions of society digitalization, the project competence of specialists in information, library and archive services represents the ability and readiness to provide information support and assistance of the project activity, its automation, creatively comprehend current knowledge and at the same time generate new knowledge, etc.

In our study, the project competence of specialists in information and library sphere is visualized with a set of three components: value-motivational (axiological), knowledge-content (cognitive), technological (activity-practical). Each of them has relevant criterial features.

Value-motivational component is determined by a set of persistent motives (personal, cognitive, professional) and, above all, involves a conscious positive attitude to the project activity, readiness for its implementation. It means realizing the importance of the project activity as a component of professional activity, interest in the project activity and means of its optimization; readiness for social interaction and readiness to participate in solving socially important problems; responsibility for performing tasks, sense of duty; the desire to process information, project solutions development using information technologies, relevant systems and tools for project management, the ability to consciously control the results of activities and the level of self-development, etc.

The knowledge-based component of the project competence implies knowledge of the project activity (knowledge of the structure of the project activity, its content, the stages of organization and execution, awareness of the requirements for the project development process and the final results, knowledge of the systems and means of project management, features and means of project tasks solutions, ability to generate new ideas, act in traditional and non-standard situations, etc.).

Technological component includes: ability to carry out the project activity, apply knowledge on social project development and project management in practice; the ability to formulate a problem that the project deals with; the ability to formulate the tasks of the project work, the ability to accept non-standard, creative solutions in problem situations; ability to navigate the information environment; the ability to act independently, the ability to work in a team, the ability to present the results of project research; the ability to provide the project

activity with human resources, scientific, methodological, organizational, and financial support.

Each component of the project competence of information, library and archive services specialists is characterized by appropriate levels of development: low (reproductive), medium (reconstructive), high (creative). The assessment and comparison of the levels illustrating the project competences development was carried out on the basis of isolated criteria, each of them representing a set of indicators that characterize qualitative changes in the criterion.

### **3. THE RESEARCH METHODOLOGY**

In our research, we relied on the provisions of the system, competence, project, activity, organizational, interdisciplinary approaches (the last of the mentioned made us use the sources from various branches of knowledge, such as management, information technology, sociology, philosophy, etc.), we used the general scientific principles in order to study socio-cultural processes. In the process of research, general scientific and special methods were used, the main of which are: methods of analysis and synthesis, comparative, statistical, terminological analysis, generalization, questionnaires, expert survey, experiment and analysis of its results with the use of mathematical data processing.

The purpose of the experiment is to check individual pedagogical conditions under which the project competence of future specialists in information, library and archive services could be developed in the course of professional training. The experiment was carried out through 2016–2018. 82 participants took part in the experiment, among them there were 62 students in the specialty 029 Information, Library and Archive Services (of which 44 persons in the formative experiment) and 12 educators, in particular, of the Communal Institution Melitopol Higher Vocational College of Culture of Zaporizhzhia Regional Council, Maria Zankovetska Nizhyn College of Culture and Arts, Nikopol College of the University “Ukraina”, as well as 16 representatives of libraries – administration and employees of the Central Library System of Desnianskyi district of Kyiv, the Melitopol City M. Lermontov Central Library, Zaporizhzhia Regional Universal Scientific Library, the scientific library of the Tavria State Agrotechnological University, the scientific library of Mykola Hohol Nizhyn State University.

### **4. THE RESEARCH OUTCOMES**

Within the ascertaining experiment (2016), by means of the expert survey the management staff and librarians of the above-mentioned institutions were interviewed to identify the specifics of the project activity in the library sphere, its real state, importance and special features of software use in the project activity of library institutions. During the survey, it became clear that among the specific features of the library project activities, most of respondents mentioned the focus on solving social issues (society demand) (78%); taking into account the request of territorial communities (75%), information and other needs of users (63%), cooperation and interaction with other establishments and institutions of culture, education, local authorities, commercial and non-profit organizations (51%).

The research proves that librarians are primarily interested in the issues of informatization of the library services (69%); having ICT skills (61%); innovations in library services (55%); project activity of libraries (48%); improving library financing (41%). With 55% of the respondents, the project activity is associated exclusively with grants and technical assistance programs, and the project competence – with the way of organizing, identifying and increasing the resource potential of libraries, improving their financial situation (38%).

We can assume that this state of affairs may be related to the traditional understanding of the project activity due to the lack of relevant professional knowledge, skills and abilities (27% of respondents do not have specialized education in librarianship, and 47% expressed an opinion on the imperfection of the content of professional training and advanced training of librarians).

72% of respondents acknowledged the importance and necessity of optimizing the project activity by using special software tools, and at the same time, 33% state the lack of knowledge, skills and abilities in project management, use of software tools for managing them. Library services specialists are experiencing significant difficulties in using the forms, methods and means of the project activity with the use of information technologies, which negatively affects the quality of the project function implementation in the professional activities and making sound decisions. Such a state of the project competence development of specialists in information, library and archive services is due to the fact that most of them did not study disciplines or special courses that contribute to the formation and development of project competence in vocational education institutions. Respondents expressed the opinion that the formation of the project competence of future specialists in information, library and archive services, in particular, using software tools for project management, should be carried out both in non-formal education (75%) and in the course of vocational training at higher education institutions (91% of respondents). This opinion was taken into account during the organization and conduct of the formative experiment.

During the ascertaining experiment (2016), we also developed tests and questionnaires for students in Year 2 and 3. We aimed to determine the degree of their awareness of the library services informatization, understanding the essence of the project competence, project activity of cultural institutions specialists, motivation regarding the project activity, methods and means of its optimization in terms of digitalization, etc. Quantitative indicators (generalized outcomes) of the ascertaining experiment are presented in Table 2.

*Table 2*

**Quantitative indicators of the ascertaining experiment outcomes by value-motivational, knowledge-content, and technological components of the project competence of future specialists in information, library and archive services**

Components	Levels		
	Low (reproductive)	Medium (reconstructive)	High (creative)
	Number of students (%)	Number of students (%)	Number of students (%)
Control group			
Value-motivational	31,8	63,6	4,54
Knowledge-content	45,45	54,54	-
Technological	72,7	27,3	-
Experimental group			
Value-motivational	45	45	10
Knowledge-content	45	55	-
Technological	75	25	-

Thus, questionnaires were used to identify the level of value-motivational component development of the students' project competence. Based on the analysis of the questionnaires, it was found out that second-year students as well as most of the students from experimental (45%) and control (47%) groups had a partial idea of the projects as part of their further professional activity and of the way it can be automated, and most of them did not relate their

professional intentions to the organization and implementation of the project activity. This testified to the lack of the need to master the project competence.

The study of the knowledge-content component of the students' project competence was carried out on the basis of the author's test tasks. According to the results of the conducted testing, second-year students, as well as representatives of the control and experimental groups showed a rather low (45.0%) and medium (55%) levels as for having conceptual-categorical apparatus in the field of project activity and its management. It turned out that respondents mostly use the terminology (project activity, project competence, project managing, and project management) which is predominantly interpreted at the level of everyday speech. At the same time, no respondents showed high level of the knowledge-content component development (see Table 2).

Determination of the level of the technological component development of the project competence meant both self-assessment of students and doing individual practical tasks. Our research showed insufficient development level of the basic project skills (to develop and plan personal activity in accordance with the project objectives, to evaluate the created project and assess one's own actions, etc.). It is proved by the outcome analysis of the students' activity (those who participated in the experiment) (see Table 2). Students experience difficulties in selecting optimal project solutions, calculating the risks, the necessary time and resources; they lack sufficient awareness of the principles and tools of project management, as well as the project development and automation of project activities. Such a state of affairs regarding the development of the technological component of the project competence can be explained by the lack of attention at higher education institutions to the formation and development of project competence of future specialists in information, library and archive services, the imperfection of teaching and methodological facilities for its formation by means of software tools for project management.

Consequently, it was found that students have an insufficient level of the project competence development (especially its technological component) according to the relevant criteria, which gives grounds for the conclusion that it is impossible to carry out their effective project activity in accordance with the requirements of the State Standard in specialty 029 Information, Library and Archive Services. In our opinion, it is explained by the lack of attention paid by institutions of higher education to the formation of skills of future library specialists regarding organization and implementation of project activities; the full potential of professional and other disciplines is not used, the provisions of theory and practice of project management are not sufficiently taken into account, etc. All these emphasize the need to strengthen the project orientation of professional training of future specialists in information, library and archive services. The results of the ascertaining experiment stressed the need to find new approaches to the project competence development of future specialists in information, library and archive services in the course of professional training, and confirmed the necessity to develop and implement specialized training courses in the educational process of higher education institutions, as well as integrative special courses on informatization of project activity.

In our study, the formative experiment (2017–2018) envisaged the verification of the effectiveness of the implementation of an integrated special course "Information Systems for Project Management in the Professional Activities of Information, Library and Archive Services Specialists" as a condition for the project competence development of future specialists in information, library and archive services. In general, among the pedagogical conditions for the formation of the project competence of future specialists in information, library and archive services in the course of professional training, we highlighted the following: integration of project and information activities into a single system; integrative approach to teaching disciplines (use of diverse knowledge to ensure the integrity of

specialists' professional training system), inclusion of the stages providing the solution of professionally oriented tasks based on information technologies in the structure of the project activity; development and implementation of specialized training courses ("Project Management in the Professional Activity of Information, Library and Archive Services Specialists", etc.) and author's special courses ("Information Systems for Project Management in the Professional Activity of Information, Library and Archive Services Specialists", "Project Activity of Information, Library and Archive Services Specialists under the Conditions of a Digital Society").

At the initial stage of the formative experiment, we developed a special course "Information Systems for Project Management in the Professional Activities of Information, Library and Archive Services Specialists" and it was implemented in professional training of junior specialists – future specialists in information, library and archive services. The basis of the special course is the principles of integration and interdisciplinary interaction of different branches of knowledge, which reveal the essence and specificity of information systems for project activity management in the information and library industry. The special course meets the requirements of the State Standard in specialty 029 Information, Library and Archive Services, and aims to ensure that students acquire in-depth knowledge, practical skills and understanding of the use of software tools for project management in their professional activities, contribute to the effective implementation of an innovative nature tasks for the appropriate level of professional activity, and they are oriented to solve complex project development problems in information and library industry.

The syllabus of the special course has the following content structure:

1.1. Specificity of projects in the activities of libraries. Innovative technologies in urgent decision-making. Automation as a modern condition of activity for the effective information management in the library sphere.

1.2. Software packs for scheduling and resource planning. Identification of software applications in industry projects. Criteria for selecting software.

1.3. Hardware support for project management (HSPM). Identification of the application possibilities at each stage of the project life cycle. Structure of the HSPM for a specific project management. Criteria for choosing HSPM.

1.4. Project-oriented portal environment for project management is a virtual project office. Technology for video conferencing, video conferencing in real time mode. Specifics of communication options for participants in the project "time-place".

Upon mastering the material of the optional subject, future specialists in information, library and archive services should be able to: organize the information environment of the library; carry out a comparative analysis of positive and negative trends in the project activity of the library, models and means of the project activity organization; organize project activities and apply software tools in project management; use knowledge, skills and abilities in project management in professional activities; plan, execute, monitor and correct projects; form and carry out the selection of project alternatives; use software and information technologies in the process of project and program management; have interpersonal interaction, adhere to corporate culture and ethics in order to achieve the goal of the project activity.

The main component of the formative experiment is the introduction of the author's special course "Information Systems for Project Management in the Professional Activities of Information, Library and Archive Services Specialists". The basis of the research was the recommendations proposed by Fedorchuk O. [25] for conducting the relevant questionnaire in order to clarify the motives for studying the discipline "Fundamentals of Informatics and Computer Technology", as well as the recommendations of Arkhypova M. [1] regarding the

development of research competence of future engineers-teachers in the course of "Organization of Research".

We considered it necessary to carry out the measurement of the value-motivational component of the project competence by identifying students with a personal attitude and motives for studying the specified special course. Thus, at the initial stage of the formative experiment before the implementation of the author's special course students were asked to answer the questions about their attitude towards the discipline, as well as to assess the motives of studying the author's special course (it is important to study; it is interesting to study; it is difficult to study; it might be useful in further professional activities; it is difficult to give an answer) by a five-point scale (1 point – the minimum significance of the motive, 5 points – the maximum).

The analysis of the students' attitude to the specified special course indicates that the vast majority (71.3%) believe that it can be used in further professional activities (4 and 5 points), and also consider it important to study this subject (62.7 %). Of the above variants, the maximum rating was number 4, the minimum – number 5. Evaluating the characteristics of number 3 it can be assumed that students find it difficult to study the themes related to information management systems, which may be explained by students' lacking a clear idea of the purpose and content of the subject. The analysis of the opinions on the characteristics of number 5 gives grounds for the assumption that future specialists in the library services quite consciously made a choice of profession, and therefore the number of neutral responses was minimal. In our opinion, the conscious choice of the profession and awareness of its significance for society positively affects the process of students' mastering the knowledge in the course of professional training.

Further diagnostics of students' motivation to study the author's special course made it possible to find out that the motives for professional self-improvement received the most remarkable assessment, in the second place – motives for self-realization, the third place was taken by social motives expressed in the sense of responsibility, the desire to gain knowledge to be useful to society, in the fourth place – cognitive motives realized through satisfaction from the process of cognition and its results.

In order to determine the level of the cognitive-content component development of the project competence, we used the questionnaire. All the questions of this questionnaire are related to the content of the author's special course. Let us specify the levels of the cognitive-content component development of the project competence demonstrated by the students in the control and experimental groups (based on the results of the initial stage of the formative experiment). Thus, the overwhelming majority of respondents (52.7% of the control group and 53.1% of the experimental group) received an average score, while the rest – 47.3% of the control group respondents and 46.9% of the experimental group showed a low level of knowledge (they gave 1 – 6 correct answers). The correct answers related mainly to the features of the project activity of libraries, and, in part, to automation as a condition for effective information management in the library sector, the methodology of organizing and conducting video conferences. At the same time, issues related to project management software, virtual project offices, etc. were beyond the students' knowledge.

The integrated assessment of the constituent parts of the technological component of the project competence included the students' self-assessment regarding their ability to use the technologies of urgent decision-making, the hardware support for project management, the ability to create a project-oriented portal environment for project management, etc. The results of students' self-assessment analysis make it possible to conclude that the components of the technological component of the project competence in the control and experimental groups were at approximately the same level (respectively, 27% and 29%). Consequently, the results of the diagnostics demonstrating the state of the technological component development

give grounds to conclude that it is relevant and important to form students' skills and abilities to use appropriate tools and technologies for project management.

Purposeful formation of value-motivational, knowledge-content, technological components of the project competence was carried out during the introduction of the author's special course "Information Systems for Project Management in the Professional Activities of Information, Library and Archive Services Specialists" in experimental groups. The results of the final stage of the formative experiment proved the effectiveness of the course implementation. After the implementation of the author's special course, future specialists in the information, library and archive services were given a repeated questionnaire; this showed the dynamics of their attitude towards digitalization of the project activity. The results of the questionnaire for the students of the control and experimental groups are presented in the generalized Table 3, which illustrates the comparison of the average values of the students' attitude towards the author's special course at the beginning and at the end of the formative experiment.

Table 3

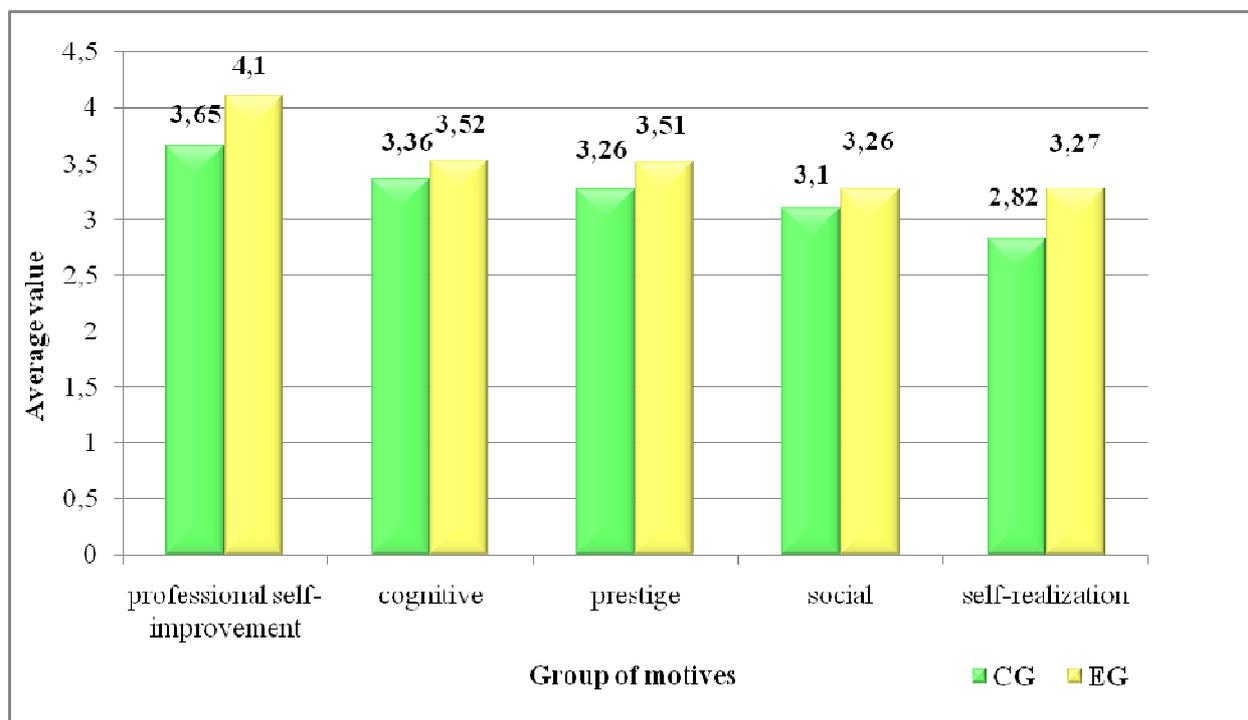
**Visualization of the attitude of students in CG and EG to the special course  
"Information Systems for Project Management in the Professional Activities of  
Specialists in Information, Library and Archive Services"  
(the beginning and end of the experiment)**

№	Attitude to the discipline	Average assessment value (CG)		Average assessment value (EG)	
		<i>Beginning of the experiment</i>	<i>End of the experiment</i>	<i>Beginning of the experiment</i>	<i>End of the experiment</i>
1	Important to study	3,34	3,23	3,14	4,35
2	Interesting to study	2,7	2,65	2,93	3,74
3	Difficult to study	3,2	3,41	3,0	2,33
4	Might be useful in further professional activity	4,42	4,45	4,31	4,84
5	Difficult to give an answer.	1,43	1,32	1,37	-

The analysis of the received data showed an increase in the significance of the digitalization of the project activity in the professional self-actualization of the students (experimental group), as evidenced by an increase in the average value of the assessment regarding the interest in the organization of the project activity by 0.81 points, the feasibility of the special course study by 1.21 points, increase in the recognition of its professional orientation by 0.53 points and minimization of difficulties in the use of means for the project activity organization by 0.67 points. Estimations that visualized the neutral response were not found.

The study of the specified author's special course caused positive changes in the students' motivation regarding project activity automation. Thus, there was an increase in the self-esteem regarding motivation in all groups of motives. At the same time, the maximum increase in motivation assessment took place in the group of cognitive, prestige, and social motives, on the basis of which it can be concluded that the students' interest in the project activity has grown on the basis of its digitalization. After completing the formative experiment, a group of motives for professional self-improvement got the maximum assessment value (the same way as before the study of the special course). According to the

motives ranking in the experimental group, the motives for self-realization occupied the fifth position (Fig. 1).



*Fig. 1. The ratio of average values of motives for the project activity digitalisation (based on the results of the final stage of the formative experiment)*

Thus, the obtained data make it possible to conclude that in the process of studying the special course there were positive changes in the students' attitude to the subject and, in fact, to the project activity and its digitalization.

In order to assess the shifts in the knowledge-content component of the project competence, we have re-used the author's tests (the same as at the beginning of the experimental study). In the course of comparing the responses of the control and experimental groups at the end of the experiment, there was an increase in knowledge of the conceptual-terminological, conceptual-categorical apparatus in the field of project activity and its management.

As the research showed at the final stage of the formative experiment, the number of low-level knowledge answers in the experimental group was 19.5% less than in the control group; the number of responses with an average level of knowledge was 11.1% less. In the control group, there were no responses that visualized a high level of knowledge. At the same time, a significant increase in the number of respondents with a high level of knowledge is observed in the experimental group (initial survey – 0%, final one – 30.6%), which testifies to the effectiveness of forming the cognitive-content component of the project competence of future librarians.

In order to assess the dynamics of the technological component formation, a re-measurement of the self-assessment demonstrating the levels of students' mastering the components of the project competence was carried out. During the analysis of the results of the final stage of the formative experiment, an increase in the number of students with a high level of skills and abilities in the project activity automation was discovered while the number of students with a low level decreased. Consequently, the greatest changes occurred in the indicators of the low level of the technological component development of the project

competence. The decrease of the low level indicator in the experimental group compared to the control group was 53.7%. The change in the ratio of the levels of mastering the theoretical aspects of the project activity automation was mainly due to the increase of the practical level of mastering and decrease of the quantitative indicators of fragmentary knowledge in automation.

The analysis of the outcomes of the experimental study confirmed the effectiveness of the author's special course "Information Systems for Project Management in the Professional Activities of Information, Library and Archive Services Specialists". The analysis of the research data makes it possible to state the positive dynamics of changes in the quantitative indicators of the levels of the project competence development in future specialists in librarianship (Table 4).

Table 4

**The development of the project competence levels in future specialists in librarianship  
(by the outcomes of the final stage of the formative experiment)**

Components of project competence	Indicators of the levels of the project competence development					
	High		Medium		Low	
	CG (%)	EG (%)	CG(%)	EG(%)	CG (%)	EG(%)
Value-motivational	38,3	57,1	45,5	39,4	16,2	3,5
Knowledge-content	-	30,6	53,8	42,7	46,2	26,7
Technological	-	34,7	29,4	48,4	70,6	16,9
Average value	12,8	41	42,9	43,5	44,3	15,7

Indicators of the knowledge-content, technological components of the project competence visualize the clearly expressed heterogeneity in the levels of these components development (lack of high-level indicators). This is primarily due to the fact that the formation of certain knowledge and skills in the organization of project activity is mainly taking place alongside the introduction of the author's course in experimental groups.

We considered the project competence in the unity of value-motivational, knowledge-content, and technological components. These components are seen as of equal importance, which made it possible to determine the generalized assessment of the project competence as the average value of all the three components development at the appropriate levels (high, medium, low) in percentage. In the experimental group there were positive qualitative changes and quantitative indicators increased significantly. At the same time, positive changes were identified in the control group, but they were not significant. The predominance of positive changes in the project competence development for students in the experimental group is visualized in Table 4.

## 5. CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH

In our opinion, the project competence of library services specialists allows to carry out professional activity on the basis of personality-oriented, activity-oriented, cultural-oriented and other approaches; to develop personal qualities (purposefulness, independence, ability to work in a team, responsibility, initiative and creativity in solving professional tasks), professional culture, as well as skills related to self-expression, self-presentation and reflection, which contributes to the personal and professional growth of specialists.

In the course of the research, the effectiveness of the author's proposed special course on information systems for project management as one of the pedagogical conditions for the

development of the project competence of future specialists in information, library and archive services in the course of professional training has been experimentally verified and confirmed. The implementation of the author's special course "Information Systems for Project Management in the Professional Activities of Information, Library and Archive Services Specialists" visualized positive changes in the levels of the students' project competence development in the experimental groups compared to the control ones. The outcomes of the analysis of the obtained data made it possible to ascertain the positive dynamics of changes in the quantitative indicators of the levels of the project competence development of future specialists. The experience of introducing a special course indicates the importance of its dissemination in other institutions of higher education. It is also advisable to develop and implement the course "How to teach the use of information systems for project management in the professional activities of information, library and archive services specialists" (for teachers) under the conditions of a multi-level variable system of retraining and professional development of specialists.

At the same time, the implementation of other pedagogical conditions which are mentioned in the text together with the implementation of the author's special course, will facilitate the development of a more informed and motivated need in future information, library and archive services specialists to become highly skilled, competitive professionals by means of project activity optimization through its automation, which will promote more effective acquisition of knowledge and mastering special skills and abilities for further successful professional self-realization.

The promising directions for further research are development and implementation of integral technology for the project competence development in future specialists in information, library and archive services with the use of information systems for project management, as well as studying the development of specialists' proficiency in the process of professional growth.

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## ФОРМУВАННЯ ПРОЕКТНОЇ КОМПЕТЕНТНОСТІ МАЙБУТНІХ ФАХІВЦІВ ІНФОРМАЦІЙНОЇ, БІБЛІОТЕЧНОЇ ТА АРХІВНОЇ СПРАВИ В ЦИФРОВОМУ СУСПІЛЬСТВІ

### **Прийма Сергій Миколайович**

доктор педагогічних наук, доцент, професор кафедри комп'ютерних наук  
Таврійський державний агротехнологічний університет, м. Мелітополь, Україна  
ORCID 0000-0002-2654-5610  
*pryima.serhii@gmail.com*

### **Аніщенко Олена Валеріївна**

доктор педагогічних наук, професор, завідувач відділу андрагогіки  
Інститут педагогічної освіти і освіти дорослих НАПН України, м. Київ, Україна  
ORCID 0000-0002-6145-2321  
*anishchenko\_olena@ukr.net*

### **Ян Дайонг**

старший дослідник, помічник директора  
Інститут освіти упродовж життя Пекінської академії педагогічних наук, Китайська Народна Республіка  
ORCID 0000-0002-9887-9257  
*yuandayong@bjaes.cn*

### **Іванова Наталя Анатоліївна**

здобувач вищої освіти ступеня доктора філософії  
Мелітопольський державний педагогічний університет імені Богдана Хмельницького,  
м. Мелітополь, Україна  
ORCID 0000-0003-3309-2813  
*ivanova1977@gmail.com*

**Анотація.** У статті обґрунтовано доцільність формування проектної компетентності майбутніх фахівців інформаційної, бібліотечної та архівної справи з використанням інформаційних систем управління проектами. Уточнено сутність проектування у бібліотечній сфері. Проаналізовано особливості проектної діяльності фахівців інформаційної, бібліотечної та архівної справи в умовах цифровізації, а також специфіку її інформатизації. Викладено особливості управління проектами як складової бібліотечного менеджменту. Охарактеризовано деякі інформаційні системи управління проектами. Конкретизовано структуру проектної компетентності бібліотечних працівників (ціннісно-мотиваційний (аксіологічний), знаннєво-змістовий (когнітивний), технологічний (діяльнісно-практичний) компоненти). Ціннісно-мотиваційний компонент визначається сукупністю стійких мотивів (особистісних, пізнавальних, професійних) і передбачає усвідомлене позитивне ставлення до автоматизації проектної діяльності, готовність до її здійснення. Психолого-змістовий компонент передбачає наявність знань про автоматизацію проектної діяльності та ін. Технологічний компонент передбачає вміння здійснювати автоматизацію проектної діяльності, орієнтуватися в інформаційному середовищі. Викладено результати експериментальної перевірки ефективності педагогічних умов формування проектної компетентності майбутніх фахівців інформаційної, бібліотечної та архівної справи (на прикладі впровадження авторського спецкурсу «Інформаційні системи управління проектами у професійній діяльності фахівців інформаційної, бібліотечної та архівної справи»). Упровадження авторського спецкурсу візуалізувало позитивні зміни в рівнях сформованості проектної компетентності студентів в експериментальних групах порівняно з контрольними. Результати аналізу одержаних даних дали можливість констатувати позитивну динаміку змін у кількісних показниках рівнів сформованості проектної компетентності майбутніх фахівців бібліотечної справи.

**Ключові слова:** цифровізація; фахівці інформаційної, бібліотечної та архівної справи; проектна компетентність; проектування; управління проектами; методи і засоби управління проектами; інформаційні системи управління проектами.

## ФОРМИРОВАНИЕ ПРОЕКТНОЙ КОМПЕТЕНТНОСТИ БУДУЩИХ СПЕЦИАЛИСТОВ ИНФОРМАЦИОННОГО, БИБЛИОТЕЧНОГО И АРХИВНОГО ДЕЛА В ЦИФРОВОМ ОБЩЕСТВЕ

### **Прийма Сергей Николаевич**

доктор педагогических наук, доцент, профессор кафедры компьютерных наук  
Таврический государственный агротехнологический университет, г. Мелитополь, Украина,  
ORCID 0000-0002-2654-5610  
*pryima.serhii@gmail.com*

### **Анищенко Елена Валерьевна**

доктор педагогических наук, профессор, заведующий отделом андрагогики,  
Институт педагогического образования и образования взрослых НАПН Украины, г. Киев, Украина  
ORCID 0000-0002-6145-2321  
*anishchenko\_olena@ukr.net*

### **Ян Дайонг**

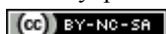
старший исследователь, заместитель директора,  
Институт образования на протяжении всей жизни Пекинской академии педагогических наук,  
Китайская Народная Республика  
ORCID 0000-0002-9887-9257  
*yuandayong@bjaes.cn*

### **Иванова Наталья Анатольевна**

соискатель высшего образования степени доктора философии  
Мелитопольский государственный педагогический университет имени Богдана Хмельницкого,  
г. Мелитополь, Украина  
ORCID 0000-0003-3309-2813  
*ivanova1977@gmail.com*

**Аннотация.** В статье обоснована целесообразность формирования проектной компетентности будущих специалистов информационного, библиотечного и архивного дела с использованием информационных систем управления проектами. Уточнена сущность проектирования в библиотечной сфере. Проанализированы особенности проектной деятельности специалистов информационного, библиотечного и архивного дела в условиях цифровизации, а также специфику ее информатизации. Изложены особенности управления проектами как составляющей библиотечного менеджмента. Охарактеризованы некоторые информационные системы управления проектами. Конкретизирована структура проектной компетентности библиотечных работников (ценностно-мотивационный (аксиологический), знаниево-содержательный (когнитивный), технологический (деятельностно-практический) компоненты). Ценностно-мотивационный компонент определяется совокупностью устойчивых мотивов (личностных, познавательных, профессиональных) и предусматривает осознанное положительное отношение к автоматизации проектной деятельности, готовность к ее осуществлению. Знаниево-содержательный компонент предполагает наличие знаний об автоматизации проектной деятельности. Технологический компонент включает умение осуществлять автоматизацию проектной деятельности, ориентироваться в информационной среде. Изложены результаты экспериментальной проверки эффективности педагогических условий формирования проектной компетентности будущих специалистов информационного, библиотечного и архивного дела (на примере внедрения авторского спецкурса «Информационные системы управления проектами в профессиональной деятельности специалистов информационного, библиотечного и архивного дела»). Внедрение авторского спецкурса визуализировало положительные изменения в уровнях сформированности проектной компетентности студентов в экспериментальных группах по сравнению с контрольными. Результаты анализа полученных данных позволили констатировать положительную динамику изменений в количественных показателях уровней сформированности проектной компетентности будущих специалистов библиотечного дела.

**Ключевые слова:** цифровизация; специалисты информационного, библиотечного и архивного дела; проектная компетентность; проектирование; управление проектами; методы и средства управления проектами; информационные системы управления проектами.



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