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Mathematics and IT in Developing Professional Competence of Managers

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Abstract: This article provides a scientific and theoretical analysis of the issues of digitization of the modern economy, the introduction of intelligent management systems, and the training of highly qualified managerial personnel in the conditions of global competition. The author substantiates the crucial role of mathematics and information technology in the formation of professional competencies in future managers and scientifically explores the pedagogical mechanisms for the development of general competence through these disciplines.

Keywords: higher education, competence, manager, AI, Data Science, project management, education system.

INTRODUCTION

In the process of building a new Uzbekistan, the development of the national economy on an innovative basis is emerging as a priority. In this process, the issues of raising the quality of education to world standards, training competitive personnel in the international labor market, and improving their professional competence are of urgent importance. In particular, in the process of training future management leaders in the higher education system, measures are being systematically implemented to create modern pedagogical conditions, bring them to a qualitatively new level, deepen professional qualifications, introduce new approaches, and effectively use innovative methods. In particular, the tasks set are: “Each higher education institution should establish direct cooperation with leading scientific and educational institutions of the world, strive for the widespread introduction of advanced technologies into the educational process, actively involve them in educational and methodological activities based on international educational standards, conduct master classes, organize advanced training courses for highly qualified teachers and scientists of friendly foreign educational institutions, systematically organize internships for young teachers and researchers on their basis, as well as retrain and improve the skills of professors and teachers.” In implementing these tasks, it is advisable to qualitatively implement effective pedagogical conditions for training modern management personnel in the higher education system and further organize research aimed at increasing the effectiveness of targeted pedagogical, pedagogical-economic and pedagogical-psychological measures for training such personnel.

LITERATURE REIVEW

An analysis of foreign literature on the integration of AI, Data Science and Project Management in the development of professional competencies of managers trained in higher education institutions around the world shows different approaches to digitalization of education. The well-known economist Bond [7], having studied the experience of universities in the USA, Great Britain and Singapore, emphasizes the integration of artificial intelligence and data science into MBA programs.

He notes the importance of an interdisciplinary approach, especially effective when applied in practice in collaboration with companies and business process simulation. Another researcher, Schaeffer [10], analyzes this process from the point of view of the organizational culture of higher education institutions and shows that the effectiveness of innovative methods depends on the readiness of management and teachers to change. Their follower, the scientist Satmunee [12], pays attention to the development of students' project management skills through PBL, while Schaeffer emphasizes that success is limited without systemic reforms.

Another researcher, Hetmańczyk [8], studying the digital deficit, found that there is a significant gap between basic and specialized skills among students: 45% have basic skills, but only 18% know advanced analytical tools. This indicates the need to increase the share of Data Science. Another scientist, Farias-Gaytan [9], reveals that digital education is lagging behind in developing countries due to limited financing and digital resources. His conclusion shows that the process of digitalization of education is uneven in the world.

Including, S.S. Gulomov, M.T. Mirsolieva, M. Pardaev, Y.U. Ismadiyarov, O.Kh. Khamidov, M. Sharifkhodzhaev's works cover in detail the issues of improving the continuous professional training of managers and specialists. Also, theoretical and practical research in this area was conducted by N.Sh. Abdullayeva [1], N. Akhmedova [2], M. Innazarov [3], T. Kalmuratov [4], Sh. Nizamova, B. Ilhomov, J. Shaturaev.

The issues of quality monitoring in the education system and increasing its effectiveness have also been the focus of attention of a number of scientists. In particular, S.T. Turgunov [5], U.I. Inoyatov, U.Sh. Begimkulov [6] and others have developed theoretical foundations in this area and given practical recommendations. The specific aspects of management in higher education institutions and the issues of training managerial personnel in educational organizations are covered in depth in the studies of A. Egorshin and S. Reznik.

ANALYSIS AND RESULTS

The effective formation of general scientific competence in future managers in the process of mathematical training is one of the important issues in the higher education system. The medium and long-term socio-economic development programs of the Republic of Uzbekistan emphasize the need to update the concept of economic education, general approaches and the entire education system based on modern requirements. This will create an opportunity to train competitive and highly qualified managerial personnel who have not only a set of academic knowledge, but also the ability to solve complex tasks based on a creative approach.

In the system of higher economic education, mathematical knowledge is considered a fundamental basis, through which students develop general scientific competence, which is a necessary condition for successful professional activity in the future. Therefore, mathematical training should not be limited to information intended only for economic education, but should be enriched with new sections and topics, as well as introduce practice-oriented courses such as “Social and Economic Forecasting”, “Mathematical Methods in Economic Research”, “Additional Sections of Mathematics”.

It is advisable to organize mathematical training on a modular basis, which should include such blocks as the fundamental “core”, additional sections, mathematical methods in economic research and socio-economic forecasting. Such an approach allows for the development of cognitive models of managers, the formation of experience in the practical application of mathematical knowledge, and the perfect development of motivational and reflexive competencies.

The observation method allows changes in the level of competence formation to be observed, the meaning of events in the educational process to be assessed. Tests are considered the most objective method, are based on standards and norms, and allow for comparison and comparison of results. Surveys analyze the level of formation of the cognitive-operational component in students. The results of scientific and educational research work provide information on the formation of the motivational-

value component. Diagnostics, in turn, allows you to assess the results of education, predict and, if necessary, correct the process.

Thus, the implementation of the indicated pedagogical conditions allows you to achieve the main goal of effectively forming general scientific competence in the process of mathematical training of future managers.

A necessary condition for the full functioning of a person in modern society is a high level of digital literacy. Digital literacy is a set of attitudes, skills and knowledge that an individual needs to easily adapt to life in a modern digital social environment.

In order to improve the quality of life of the population, implement socio-economic changes, and shape and transform the economy under the influence of information technologies, conscious and controlled development of digital literacy is necessary.

In order to fully realize the opportunities provided by digitalization, it is necessary to understand the changes in the labor market and the set of skills required for jobs. Every year, with the rapid development of technologies, changes occur in the labor market. However, “the use of technologies to perform complex tasks (telephony, video viewing, text exchange, etc.) does not reduce the digital divide between those who can effectively work with information using digital technologies and those who use them only to replace traditional methods.”[11]

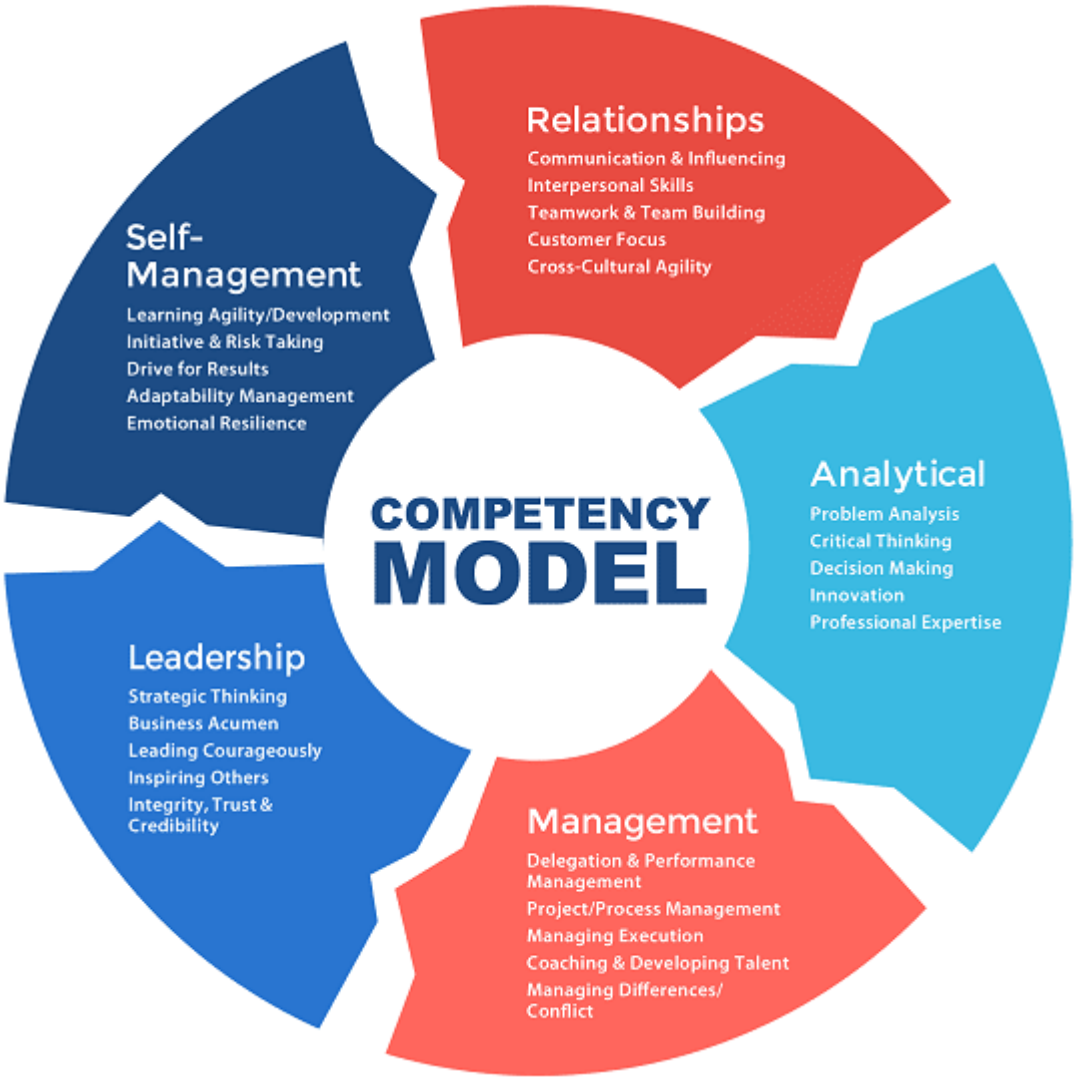

Fig.1. Competency Modeling for Beginners [16]

Currently, in all developed and civilized countries, it is impossible to get a job, including as a teacher, without sufficient digital literacy. Because digital literacy is the basis for the formation of a teacher's professional ICT competencies.

A teacher's digital literacy is assessed through his information, computer, communicative and media literacy, as well as his attitude to modern digital technologies.

Today, it is important that the university not only adapts to the digital economy, but also provides students with the necessary skills for successful professional activity in conditions of change, uncertainty and high dynamics.

Trends observed in modern higher education include:

- individualization of education, i.e. the use of an individual approach in the process of choosing and supporting a student's personal educational trajectory, as well as personalization in the process of goal setting;
- acceleration and mobilization of the educational process, i.e. the use of mobile educational technologies, the development of students' related skills, and the improvement of the modular education system;
- integration of online and offline educational spaces;
- formation of soft skills necessary for all professions in students.[12]

According to some scholars, digital literacy includes working with digital information, using computer and media information, effective communication, and an attitude towards digital innovations.[13]

The level of digital literacy of a teacher is determined by assessing his attitude towards innovative digital technologies and the level of information and computer literacy.

In order to determine an individual educational trajectory for the formation of digital skills in future teachers, the state educational standards and curricula in force in the Republic of Uzbekistan were analyzed. The practice of teaching "Informatics and Information Technologies" in grades 5–11 has been established in schools in the country, and teaching programming methods based on modern textbooks is widely used.

As is known, the "One Million Uzbek Coders" project is being implemented in our country in cooperation with the Ministry of Information Technologies and Communications Development, the Dubai Future Foundation, Inha University in Tashkent, the IT Academy, and the Muhammad Al-Khwarizmi IT School.[14]

In 2022, about 1.2 million Uzbeks graduated from IT courses within the framework of the "One Million Uzbek Coders" project in cooperation with Uzbekistan and the UAE.[15]

An analysis of school textbooks and curricula in our country has shown that graduates of secondary schools should have sufficient knowledge of computer science and achieve a basic level of digital literacy. At the same time, every year the number of school graduates choosing the national test block in computer science is increasing. However, since computer science is not specified as a compulsory subject in the entrance exams for pedagogical specialties, most applicants study this subject at school at the basic level.

Systematic and effective work on organizing activities aimed at forming digital skills allows you to bring the educational process closer to life and increase students' motivation to use digital technologies.

CONCLUSIONS

The results of the study show that mathematical training is the main fundamental tool for the formation of general competence in future managers. Through it, students develop analytical thinking, solving problems on a scientific basis, relying on digital data in decision-making, modeling and forecasting

economic processes. This ensures that they will achieve high efficiency in their future professional activities.

The systematic formation of professional competences of future managers was justified by organizing the content of mathematical education on the basis of invariant and variable components, introducing a modular structure, strengthening interdisciplinary integration, and using developmental educational technologies. It has also been scientifically proven that the four-level system of tasks (reproductive, algorithmic, transformative, creative-search) serves to gradually develop the intellectual potential of students.

It was substantiated that the formation of general competence is a continuous process, which must be developed gradually throughout the entire period of education. The introduction of an integrated monitoring system in this process creates the opportunity for an objective and systematic assessment of the level of knowledge, skills and competence of students.

In conclusion, mathematics and information technology disciplines serve as a fundamental basis for the formation of professional competencies of future managers. Their deep integration into the educational process, their content and methodological modernization are important conditions for the training of highly qualified managerial personnel who are competitive, capable of strategic thinking and solving modern economic problems on a scientific basis.

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