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PERIODISATION OF HIGHER IT EDUCATION IN US UNIVERSITIES: STAGES OF DEVELOPMENT AND KEY TRENDS

Abstract. The article is devoted to the analysis of the periodisation of the formation process of IT bachelor professional training at US universities. It examines the key stages in the development of educational programmes from their inception in the 1960s to current trends. The authors highlight significant changes in curricula and teaching methods that reflect the evolution of technology and labour market needs. The study emphasises the importance of adapting educational standards to the rapidly changing conditions in the field of information technology.

Keywords: vocational education, periodisation, information technology, university, training.

ПЕРІОДИЗАЦІЯ ВИЩОЇ ІТ-ОСВІТИ В УНІВЕРСИТЕТАХ США: ЕТАПИ РОЗВИТКУ ТА ОСНОВНІ ТЕНДЕНЦІЇ

Анотація. Статтю присвячено аналізу періодизації процесу становлення професійної підготовки бакалаврів з інформаційних технологій в університетах США. У ній розглядаються ключові етапи розвитку освітніх програм, починаючи з формування в 1960-х роках і до сучасних тенденцій. Автори виділяють значні зміни у навчальних планах та методах викладання, що відображають еволюцію технологій та потреб ринку праці. Дослідження підкреслює важливість адаптації освітніх стандартів до умов, що швидко змінюються в галузі інформаційних технологій.

Ключові слова: професійна освіта, періодизація, інформаційні технології, університет, становлення.

Given that the content of professional training of future IT specialists in any country is constantly evolving and changing, we believe it is quite appropriate and reasonable to identify certain stages of formation and development of bachelor's degree in IT in the United States, i.e. to consider its periodization. This periodization serves as a methodological basis for determining the dynamics, directions and trends in the development of the content of professional training of future IT specialists. The study of the historical and pedagogical process allows us to better understand it, identify internal patterns and provide an opportunity for scientific generalisation.

The formation of a single information space, global digitalisation and democratisation have had a significant impact on the development of higher education over the past few decades. The set of social concepts or patterns of thinking, including theories, research methods, postulates and standards, has changed its course first from technocratic to industrial, and then to informational.

The study of the problem of the emergence and development of vocational education in the United States, in particular, vocational training in the field of computer science, is presented in the works of V. Bondarenko, N. Havryliuk, O. Elbrecht, V. Kudin, I. Kozubovska, V. Lola, L. Tarasiuk, S. Brunner, E. Eddy, E. James, etc.

In order to justify the choice of effective approaches for structuring the historical process, examples of periodization in other scientific directions were analysed, including analysis from the point of view of social and economic history, which made it possible to identify common principles and regularities. Such interdisciplinary analysis helps to assess the development of education in the context of different historical stages more accurately and comprehensively. N. Gavrilyuk's periodization relating to agrarian education was considered as one of the effective approaches for structuring the historical process in agrarian field. As a result, Gavrilyuk's approach seems logical and reasonable, as it takes into account the key factors and changes in the agrarian sphere over time.

In the research of N. Havryliuk identifies the main seven stages of the formation of agrarian higher education (Havryliuk, 2019): the first stage includes the period of foundation of colleges (1636-1776), the second stage the period of experimentation (1776-1862), the third stage - the period of emergence of universities (1862-1900); the fourth stage - the period of opening of two-year colleges (1900-1950); the fifth stage is the reform of the US higher education system in accordance with the requirements of scientific and technological progress (1950-1980); the sixth stage is the great influence of political processes on the development of education (1980-2000); the seventh stage is the increase in requirements for professional training of future specialists (2000-present).

According to V. Lola, one of the main features of American vocational education is flexibility and the ability to respond quickly to the needs of society, the labour market and the country's economy as a whole. Within the framework of the state development paradigm, education serves as a driving force for progress, one of the main conditions for the country's development (Lola, 2017).

Researcher Sharan R.V. in his historical and pedagogical analysis identifies 5 stages of development of distance education in the USA (Sharan, 2010): Correspondence (1870-1910) - the emergence of distance education in correspondence form at a time when the regular public communication system was the post office; technically facilitated (1910-1960) - development of distance education based on the introduction of the first technical teaching aids: slides, films, radio; media education (1960-1985) - creation of a public television broadcasting system in the United States,

broadcasting of university television lectures with further consultations with teachers, orientation of most American teachers to the use of media; scientific and fundamental (1985-1995) - formation of distance education as an independent scientific field with its own history, philosophy, theory, subject matter; information and communication (1995-present) - distance learning with the use of the latest information technologies, formation of innovative approaches to the development of distance education related to new means and possibilities of information delivery.

To develop a periodization of the development of professional training of future IT specialists in the USA, we consider it as a system that includes a number of interrelated components. An in-depth and comprehensive analysis of the content of professional training of future IT specialists related to history, present and future implies:

– description and analysis of the main periods of development of professional training of future IT specialists;

– substantiation of the main trends in the content, connections and factors that determine the direction of its development;

– defining the role and place of IT training in the US education system at this historical period.

That is, periodization as a procedure for dividing historical and pedagogical reality, limited by certain time frames, into periods that are qualitatively different from each other, is an indispensable element of studying methodological experience and predicting the possibilities of its use.

According to N. Gupan, periodization is a logical delineation of the period under study in terms of the qualitative characterisation of its relatively independent stages. Such a characteristic should reflect both general patterns of development and specific ones, as well as the essential points of the main methods and forms of the genesis of the problem and the definition of the stages of its development (Gupan, 2000).

The periodization criteria should reflect fundamental shifts in the main directions of development of both the professional training of future IT specialists and its content.

A systematic approach to the periodization of the development of professional training of future IT specialists allows:

– to periodise the development of professional training of future IT specialists in relation to the periodization of the development of science and technology, since each of them has a certain impact on the system under study, determining its development;

– to define the external boundaries of the time division of the development of professional training of future IT specialists, which are

outlined by those events, phenomena, processes of social life that have caused qualitative changes in education;

– to study the essential and cause-and-effect relationships between the elements of professional training of future IT specialists.

Also, the systematic approach makes it possible to determine objective criteria for identifying periods of development of professional training of future IT specialists in the United States, including:

– professional training of future IT specialists is inextricably linked to the socio-economic, scientific, technical and cultural development of society;

– period should be characterised by the use of new approaches in research activities and evaluation of its results;

– each of the defined periods should be characterised in terms of the essence, priority of trends and contradictions of development on the basis of their comparative and methodological analysis;

– the emergence of a set of concepts that are not logically related to the previously existing ones;

– each period is characterised by the development and application of certain information carriers of educational knowledge that affect the intensity of the transfer and assimilation of knowledge in computer science;

– periodization should take into account the introduction of new scientific and historical sources into scientific circulation;

– each period is characterised by contradictions between subjective and objective factors of scientific and methodological knowledge;

– infrastructure can be identified for each period: prominent scientists, methodologists whose activities had a decisive impact on the development of professional training of future IT specialists.

In accordance with this, we have developed a periodization of the development of professional training of future IT specialists in the USA based on a systematic approach in the context of the development of computer science:

– the first period (40s of the twentieth century - 50s of the twentieth century) – the emergence of the first computers, the creation of computer science disciplines that reflected the content of professional training of IT specialists.

– the second period (50s of the twentieth century - 80s/90s of the twentieth century) - the formation and development of electronics, which led to the emergence of the first faculties of system and computer engineering and information technology and the first bachelor's, master's and PhD programmes in IT.

– the third period (90s of the twentieth century - early twenty-first century) – Informatisation of society, emergence of autonomous IT departments in universities focused on training IT specialists.

– the fourth period (early XXI century-20 th years of the XXI century) – active digitalisation of public (social) processes, dynamic development of distance and online education with large-scale use of e-learning management systems (Moodle, iSpring, WebTutor, Teachbase, GetCourse), emergence of new IT specialities and IT industries due to the development of computer and Internet technologies, rapid development of neural networks and their widespread use in higher education and software functionality. The development of IT education has also been significantly influenced by the achievements of the industrial revolution, among which automated production, powerful computers, IT-systems and robotics, smart factory, autonomous systems, IoT and machine learning have had the greatest impact.

Thus, considering the periodization of the development of professional training of future IT specialists in the United States as a consistent change of stages of formation and development, we perceive the emergence of new elements and connections in this holistic system as the beginning of a qualitatively new system that replaces the old one, that is, a transition from one qualitative state to another, higher one. Such a continuous sequence of new qualitative states is the process of development of professional training of future IT specialists in the United States, which has its own period of formation.

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