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TRAINING AIR TRANSPORT TECHNOLOGIES SPECIALISTS: FOREIGN EXPERIENCE

Abstract

*The article is devoted to analysing the system of professional training of future specialists in air transport technologies in foreign higher technical education experience. **The purpose** of the article is to highlight the peculiarities of foreign experience in the formation of future aviation industry engineers professional competences under the influence of scientific and technical progress. Examples of aviation specialists theoretical and practical training in higher education institutions of the USA, Great Britain and the member-states of the European Union based on the use of innovative problem-oriented, distance and mixed learning methods, fruitful cooperation with stakeholders, taking into account the autonomy of educational institutions and the educational system flexibility are given.*

*Theoretical and empirical **methods** of comparative and generalizing analysis of different level academic programs (Bachelor's & Master's) and aviation specialists training experience have been used in the research.*

***Results.** The system of the USA future pilots professional training effectively combines theoretical and practical types of activities, intensive use of computer technologies in the training process significantly improving its quality and effectiveness. According to the bachelor's and master's programs in aeronautical engineering presented by Great Britain higher technical education institutions, the training content involves an in-depth study of the flight practice basics and subjects of the professional orientation. The professional training of future specialists in air transport technologies in higher educational institutions of Germany is focused on integrated studying, practical training, internships and advanced training in airlines. The analysis of the international experience of future specialists in air transport technologies professional training shows that the characteristic features of training are the mandatory combination of theory and practice, with special emphasis on the professionally-oriented subjects in educational and professional programs, academic curricula, sufficient number of training hours for practice and internship in order to increase the future specialists competitiveness and attract experienced aviation experts to participate in the educational process.*

***Conclusion.** Thus, it was concluded that in higher technical education institutions of EU member states (Germany, France, Poland), USA and Great Britain, the content of future specialists in air transport technologies professional training is based on the relevant educational standards implemented in educational and professional training programs involving the inclusion of practice-oriented academic subjects. It should be noted that the educational process of training air transport technologies specialists in higher technical education institutions of foreign countries is based on the application of traditional and rationalistic models as well as the developmental training model.*

***Keywords:** air transport technologies specialists, professional training, higher technical education institutions, professionally-oriented subjects, foreign experience, education technologies.*

Introduction. The development and modernization of the higher technical education in Ukraine, the aviation industry, in particular, brings to the fore the training of specialists in air transport technologies, the formation of their readiness for professional activity since the development of engineering and technical, production technologies depends on the level of their professional competence, approval of market principles of management. In this context, the study of the USA, Great Britain and the Member States of the European Union experience regarding the training of competitive specialists in air transport technologies and the determination of directions for using such experience will have a positive effect on the development of the Ukraine aviation industry. (Андрущенко, Тернопільська & Якимець, 2015)

Theoretical and practical aspects of the the aviation specialists professional training are reflected in the researches by V. Asriyan, I. Borets, O. Brodova, D. Gander, G. Gerasimenko, O. Zadkova, O. Kovalenko, O. Kernytskyi, H. Leshchenko, R. Makarova, E. Mileryan, S. Martynenko, O. Moskalenko, T. Plachinda, T. Tarnavska, I. Feynman and others. The results of the above specialists' research activities are fundamental in the development of the conceptual foundations of our research.

The purpose of the article is to highlight the peculiarities of foreign experience in the formation of future aviation industry engineers professional competences under the influence of scientific and technical progress.

The research **objectives** are:

- to consider the meaning of the phenomenon in scientific discourse;
- to analyze the peculiarities of future specialists in air transport technologies professional training in the foreign experience.

Research Method and Methodology. The formation of the future specialists in air transport technologies readiness for professional activity involves study of the foreign aviation specialists training experience, the system of education in the aviation area of the EU member-states, the USA, the Great Britain.

In connection with the digital economics programs implemented by many world countries, the study of the future specialists in transport technologies professional training features, formation of the professional competences of the activity subject in the context of the "Fourth industrial revolution" characterized by the accelerated renewal of existing and the emergence of innovative technologies in leading production branches becomes relevant (Бакуліна, & Тернопільська, 2020). In light of this, the researchers' studies (Toffler, 2004) introduce the events of scientific and technical progress affected by the essential characteristics of the future engineers' professional competencies that therefore should be taken into account by the world pedagogical community. Among such events there are the following: 1) the technologies and engineering developments characterized as "end-to-end" technologies of the digital economics; 2) the formation of the knowledge management theory in connection with the transition of the world community to a new type of resource economics - the "knowledge economics" based on the statement that knowledge as a component of human competencies can be used by organizations to acquire competitive advantages; 3) the development of Semantic Web technologies, the key elements of which are ontologies creating the knowledge interoperability in information resources, in particular, educational ones; 4) creation of competence models, the center of which is the subject of professional activity, his/her individual trajectory to obtain education, professional and personal development: INCOSE UK SE Competence Systems, Model of Competences of Systems Engineering MITRE, SPRDE-SE / PSE Competence Model etc.

Results. The analysis of foreign experience regarding the future specialists in air transport technologies professional training confirms that its characteristic features are the integration of theory and practice; predominance of the professionally-oriented subjects in training programs; the emphasis on practice and internship as a guarantee of future employment; involvement of practical aviation experts to teaching. In the training process various methods are used aimed to develop the students' skills and abilities: case studies, problem-based methods, role-playing games, lectures by airport and airline representatives, the project method, excursions to airlines and airports etc. Accordingly, the professional training of future specialists in air transport technologies for professional activity is oriented to the economy needs, enterprises in the domestic and foreign markets, and the society needs (Бобрицька, 2012).

Discussion. The formation of the future specialists in air transport technologies readiness for professional activity involves study of the foreign aviation specialists training experience, the system of education in the aviation area of the EU member-states, the USA, the Great Britain.

Let's consider the features of specialists in air transport technologies professional training in the USA. In the field of education and professional training of aviation specialists in the United States almost 100 universities offer aviation programs. The following characteristics of American aviation training are: predominance of practical training over theoretical one, application of innovative problem-oriented and electronic training methods, close cooperation with employers, autonomy of educational institutions, flexibility of training. (Дерев'янюк & Тернопільська, 2011).

In particular, Purdue University flight school is the only school where students can pilot aircraft during their studies. On the basis of the technological college of the university, students can obtain the profession of a pilot, speciality in aviation management, aviation engineering and flight technologies.

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The University of the Fraser Valley offers a popular bachelor's degree in business administration with a specialization in aviation. This program lasts for 4 years and includes extensive practice and internship. Upon completion of the program, students receive private and commercial pilot licenses that allow them to pilot different types of aircraft in different conditions. At the same time, both licenses meet the ICAO standards, allowing to operate both domestic and international flights.

The Florida Institute of Technology includes a separate College of Aeronautics, that trains specialists for work in global aviation. College students get an opportunity to study in a modern aircraft fleet and flight simulators, get access to the best information resources. The college offers bachelors' and masters' programs in pilot training, aviation management, air traffic control, flight control, aviation operations, flight planning, aviation meteorology, etc.

Professional training of air transport specialists in the USA takes place in accordance with the FAA program in two parts: part 141 and part 61. Training according to the first part is much stricter, as it does not allow any deviation from the established methodology. The theoretical and practical part of the program are carried out in full and established order. Thus, an increase in studying hours is possible and a decrease is not allowed. A student is not admitted to the examinations if the school is not sure of the training quality. Part 61 training takes longer, but the requirements for cadets are less strict. Since the school may develop its own training methods there is no established training program. The training of future specialists in air transport technologies under part 61 program is 60 hours longer than part 141.

It should be noted that pilots professional training in the USA is flexible, it combines theoretical and practical activities, the use of computer technologies in the educational process, which significantly improves the quality and efficiency of future pilots training (Pidlubna, 2013).

In the process of professional training of pilots, the important component of the training is the independent work of students, as this form of education contributes to the development of an alternative vision of the situation, the ability to independently solve problems and perform tasks, rational and critical thinking.

Lecture classes are problematic in nature and students must get ready for the lectures. The leading direction of future specialists practical abilities and skills development is the practical training during the entire period of studying with parallel practice and seminars starting from the first year. Such approach to the practice management ensures the integration of theoretical knowledge, practical skills and exchange of experience of the future specialists in air transport. (Bakhov, Brovko, & Zagorodnya, 2020). In the USA, it is a popular practice for airlines to cooperate with educational institutions to improve the quality of the future specialists training. The airline has the right to provide financial assistance to the future pilots and to employ them after graduation. There are also national aviation associations in the USA, that through cooperation improve the future specialists training, coordinate the training program and carry out joint projects, competitions etc.

It is possible to single out the following directions of using experience, in particular, of specialists in air transport technologies professional training in the USA: cooperation of aviation industry state, private and public institutions and employers with educational institutions for graduates employment; educational programs optimization, increasing the number of practical classes for students; expansion of international cooperation between education institutions on the training of air transport technologies specialists; reorganization of the cluster approach to the professional training of specialists (unification of business structures, scientific and education institutions for joint development of the aviation industry); creation of conditions for academic and professional mobility of specialists in transport technologies.

In Great Britain, Bucks New University is the undisputed leader for aviation training of specialists in air transport technologies. The university is the only one in the country that has the «People 1st Gold Award In Aviation» award for aviation programs (2015 – 2017) (Bucks New University, 2023 para 2). Professional training at the university is carried out under the "Airline and Airport Management" program lasting for three years. During the first year of studying students get acquainted with the the aviation industry structure and operation, aviation marketing, personnel management, economics and finance, safety and security issues in the aviation industry. An important issue is the integration of economic and managerial competences with the aviation sphere. The second year covers the development of managerial, analytical and decision-making skills of future specialists. Students research the airports and airlines operation, prepare for seasonal work at the airport. The third year involves the implementation of an individual project, studying the aviation modules on globalization, operation support, commercial analysis and planning. Expert lecturers from the aviation industry are invited to conduct the training process.

Aviation programs at London's Kingston University are among the best not only in Great Britain, but also in Europe. The university's bachelor's program is among popular ones and focuses on commercial pilots training for a year at the private Bournemouth Commercial Flight Training (BCFT) center in Dorset. The Institute of Higher Technical Education also offers a bachelor's and master's programs in aeronautical engineering, upon completion of which the student receives the status of a professional engineer with the Royal Aeronautical Society.

One of the leading universities in Germany, where the future specialists in air transport technologies professional training is carried out is the "IUBH" University of Applied Sciences. The institution ranks first among popular higher education institutions thanks to the employment statistics after graduation: 94% of graduates found a job within the first three months and after two years of work 80% of specialists take on management functions. Such results are motivated by a professional approach to training, that includes a combination of theory and practice, a large number of interesting training programs, the formation of small groups of students, the presence of experienced lecturers working in the field of aviation. Graduates of the "Aviation Management" program (180 credits) are offered a job in the traditional airlines "Lufthansa" and "Air France-KLM", low-cost "Ernest Airlines", handling companies, companies for aircraft production and maintenance. The main methods, used during the training are lectures by airports and airlines employees, case studies, projects, excursions to airlines and airports. It is also possible to single out specific training methods that are typical for the air transport technologies specialists professional training in Germany: seminars, a method of internalizing authentic events (facts). This approach to learning is efficient since it brings students as close as possible to professional activity. (IUBH University of Applied Sciences, 2023 para 1).

During studying at the "IUBH" University of Applied Sciences, students master airline and airport finance, aviation law, management of aviation organizations, marketing and sales, business communication and information technology. It is important to emphasize such subjects as: "Transport Systems and Technologies Management", "Aviation Security", "Mathematical Methods of Transport Systems Optimization", "Air Transportation Management", "Aviation Economy and Policy" (IUBH University of Applied Sciences, 2023 para 1).

In addition, special attention is paid to practical training, internships in airlines and integrated training. For internships a special "Career Office" center has been created that not only helps to find a place for an internship but also advises on the future employment, holds meetings and informal events, monitors documents and provides personal recommendations. The duration of the internship is one semester, i.e. 5-6 months during which the future specialists can prove themselves at work and establish working relations with the future employer. Such a center serves as a connecting link between the future specialists and employment, contributing to professional self-realization and the formation of readiness for it.

International University of Applied Sciences Bad Honnef specializes in training of professional aviation managers. Graduates of the university work in such well-known companies as Lufthansa and Air France-KLM, as well as in low-cost companies such as Eurowings. Studying in English at a higher education institution it is possible to get a bachelor's degree in aviation management, a bachelor's degree and a master's degree in international aviation management.

The priority directions of reforming the higher education system in France in accordance with the goals of building the European space are: 1) increasing the number of students including foreigners; 2) creation of professionally-oriented programs at universities; 3) development of scientific research in engineering-technical universities; 4) increasing academic mobility; 5) increasing the accessibility to higher education. It should be noted that a distinctive feature of the education system in France is that specialized training of future specialists can be carried out in various higher professional schools (Higher commercial schools, Higher engineering schools, Higher mountain schools etc.) (Hunot, 2000). In addition, each school offers its students a large number of educational programs they can choose according to their interests and aspirations.

The National School of Civil Aviation «Ecole Nationale de l'Aviation Civile» is the only aviation-oriented university in France and in Europe offering a wide range of educational programs and activities that serves for the development of aeronautics, in particular, the air transport sector. The ENAC University has 2,000 students in 25 different courses: engineer, master, doctor of philosophy, air transport, pilot, air traffic controller etc.; 7,500 trainees annually - 400 continuing education programs, advanced training courses. The University has 10 research laboratories. International students and interns from 5 continents study at ENAC every year (Ecole Nationale de l'Aviation Civile, 2023 para 2).

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Regarding the current trends in the professional training of specialists in air transport technologies in Poland, the experience of the University of Information Technology and Management that offers the training program "Aviation Management" is interesting and lasts for 6 semesters. This program is held under the "Deutsche Lufthansa" airline patronage (University of Information Technology and Management, 2023 para 1). The university uses special "ARCPort" software used in more than 80 international airports operation. The program features involve first year students concentration on economics and management that are the fundamentals of aviation management and mastering of specialized subjects from the second year of studies: «Aviation Management and Policy», «Aviation Law and Organizations», «Airline Network Management», «Airport Management», «Air Cargo Management», «Air Navigation».

The university involves aviation transport practitioners to give lectures. The University offers mandatory internships at air enterprises: London Heathrow Airport, Brussels Airport, airports in Poland (Warsaw - Okeche, Katowice - Pyzowice, Krakow - Balice, Rzeszów - Jasionka), the International Civil Aviation Organization, the Civil Aviation Authority of Poland, various airlines ("Qatar Airways, Ryanair, Wizzair, LOT Polish Airlines) and other organizations (Pratt&Whitney, Rzeszów S.A. MTU Aero Engines Polska BorgWarner Menzies Airport Deloitte Polska Carlson Wagonlit Travel).

Politechnika Rzeszowska named after Ignacego Łukasiewicza is a state technical university that, according to the Webometrics Ranking of World Universities, ranks 10th among Polish technical universities and 960-th among technical institutions worldwide. The Faculty of Mechanical Engineering and Aviation of the Rzeszów Polytechnic University is the only one in the Republic of Poland training pilots for civil aviation since 1976. Graduated pilots receive a diploma (MSc in Aeronautical Engineering) and a 2-nd class license (CPL) (Rzeszów Polytechnic University, 2023 para 3).

Higher State Vocational School in Khelmi is the only educational institution in Poland that gives students an opportunity to study practical aviation. In particular, students of the Faculty of Mechanics and Mechanical Engineering take a special pilot training course at the Khelmi Aeroclub and receive professional pilot licenses upon completion (Higher State Vocational School in Khelmi, 2023 para 2).

Conclusion. Therefore, the content of professional training of future specialists in air transport technologies in higher education institutions of EU member states (Germany, France, Poland), the USA and Great Britain is determined by the relevant educational standards, specified by educational and professional training programs and involves inclusion of practically-oriented academic subjects into these programs. The organization of the educational process in higher education institutions for the future specialists in air transport technologies training in the above countries is carried out on the basis of the application of traditional, rationalistic models and the developmental training model.

Further promising research directions could be studying the Asian countries experience in ensuring the quality training of future air transport technologies specialists.

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ПІДГОТОВКА ФАХІВЦІВ З АВІАЦІЙНИХ ТРАНСПОРТНИХ ТЕХНОЛОГІЙ: ЗАРУБІЖНИЙ ДОСВІД

Резюме

Статтю присвячено аналізу системи професійної підготовки майбутніх фахівців з авіаційних транспортних технологій у досвіді зарубіжної вищої технічної освіти. **Метою** статті є висвітлення особливостей зарубіжного досвіду формування професійних компетентностей майбутніх інженерів авіаційної галузі під впливом науково-технічного прогресу. Наведено приклади теоретичної та практичної підготовки авіаційних фахівців у закладах вищої освіти США, Великої Британії та країн-членів Європейського Союзу на основі використання інноваційних, проблемно-орієнтованих, дистанційних та змішаних методів навчання, плідної співпраці зі стейкхолдерами, з урахуванням автономії навчальних закладів і гнучкості навчального процесу.

У дослідженні використано теоретичні та емпіричні **методи** порівняльного аналізу та узагальнення освітніх програм різного ступеню, а також досвіду підготовки майбутніх авіаційних фахівців.

Результат. У системі професійної підготовки майбутніх пілотів США ефективно поєднуються теоретична та практична види діяльності, інтенсивне використання комп'ютерних технологій у навчальному процесі, що значно поліпшує його якість та результативність. За програмами бакалаврату й магістратури з авіаційної інженерії, представленими закладами вищої технічної освіти Великої Британії, зміст підготовки передбачає поглиблене вивчення основ льотної практики та предметів професійного спрямування. Професійна підготовка майбутніх фахівців з авіаційних транспортних технологій у вищих навчальних закладах Німеччини орієнтована на інтегроване навчання, практичну підготовку, стажування та підвищення кваліфікації в авіакомпаніях. Аналіз міжнародного досвіду професійної підготовки майбутніх фахівців з авіаційних транспортних технологій свідчить про те, що характерними особливостями навчання є обов'язкове поєднання теорії та практики з акцентуванням особливої уваги на дисциплінах профільного спрямування в освітньо-професійних програмах, навчальних та робочих планах, присвяченню достатньої кількості навчальних годин практиці та стажуванню з метою підвищення конкурентоспроможності майбутніх фахівців та залучення досвідчених авіаційних фахівців до участі у навчальному процесі.

Таким чином, зроблено **висновок**, що у закладах вищої технічної освіти країн-членів ЄС (Німеччини, Франції, Польщі), США, Великобританії зміст професійної підготовки майбутніх фахівців з авіаційних транспортних технологій засновано на відповідних освітніх стандартах, реалізованих в освітньо-професійних програмах підготовки, що передбачають включення навчальних дисциплін практико-орієнтованого спрямування. Важливо зазначити, що освітній процес з підготовки фахівців з авіаційних транспортних технологій у закладах вищої технічної освіти зарубіжних країн базується на застосуванні традиційної та раціоналістичної моделей й моделі розвивального навчання.

Ключові слова: фахівці з авіаційних транспортних технологій, професійна підготовка, заклади вищої технічної освіти, дисципліни професійного спрямування, міжнародний досвід, технології навчання.