

Contemporary Technologies and Society: Innovations, Artificial Intelligence, and Challenges

Katowice
2023



**CONTEMPORARY TECHNOLOGIES AND SOCIETY:
INNOVATIONS, ARTIFICIAL INTELLIGENCE,
AND CHALLENGES**

Collective Scientific Monograph

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and Oleg Bogut*

Katowice 2023

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ISBN 978-83-969890-0-0

DOI: 10.54264/M029

Editorial compilation :

The University of Technology in Katowice Press
43 Rolna str., 40-555 Katowice, Silesia Province, Poland
tel. (32) 202 50 34; fax: (32) 252 28 75
email: kontakt@wydawnictwo.wst.pl
www.wst.pl, www.wydawnictwo.wst.pl

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PREFACE

The collective monograph elucidates the trends in the formation and development of the digital society in the 21st century, and the role of information and communication technologies therein. Presently, information and innovative technologies are shaping more efficient management mechanisms, expanding access to healthcare, education, science, culture, and banking, enhancing the quality of public services, and broadening communication and information access capabilities.

The research findings presented in the monograph underscore the significance and necessity of digital technologies for the welfare of the population and economic development. Today, information and innovative technologies are integrated into business processes across virtually all spheres of activity, as they enhance decision-making efficiency. Information technologies enable any activity to be conducted online, facilitating solutions to social issues by easing access to education through remote learning, local government services through e-governance, electronic registration systems, medical services via digital health systems, and the provision of electronic financial and banking services.

The first chapter of the monograph analyses the current state and prospects of using information and innovative technologies in education, presents research results on the application of artificial intelligence, machine learning, nanotechnologies, and virtual reality in higher education training. It also highlights the nuances of developing digital competencies among schoolchildren and students.

The second chapter is dedicated to the application of information and innovative technologies in economics and management, examining their impact on the economy of the information society. The digital economy is grounded on information and communication technologies that facilitate e-commerce through the operation of electronic digital devices, tools, and automated systems.

The third chapter contemplates the theoretical concepts of employing information and innovative technologies in society at large, considering their influence in fields such as ecology, social issues, psychology, and professional adaptation to digital existence.

The fourth chapter is devoted to the utilization of artificial intelligence, studying its societal impact and evaluating potential opportunities and risks. Particular attention is given to the status and prospects of artificial intelligence in education, manufacturing, medical fields, and the development of communicative competencies.

The fifth chapter of the monograph focuses on contemporary technologies in physical education, sports, and physical rehabilitation, which are paramount in the context of ensuring effective approaches to physical development, rehabilitation, and fostering a healthy lifestyle approach.

Editors

PART 1

Innovative Educational Technologies and Practices in Education

1.1. THE CURRENT STATE OF THE IT MARKET AND HIRING CHALLENGES FOR THE IT COMPANIES

The state of the information technology market has a profound influence on strategic planning and forecasting for businesses for several reasons:

1. **Rate of Change:** In the IT sector, technologies are constantly evolving. If a company does not monitor these changes, it may lose its competitive edge.
2. **Innovation:** Innovations in IT can dramatically shift market dynamics. New products and solutions can disrupt existing business models or create new market niches.
3. **Dependency on Technology:** The majority of companies now rely on IT to optimize their operations, enhance customer service, and maintain efficiency.
4. **Cybersecurity:** With the rise in cybercrime, the state of the IT market can influence security threats to businesses. Enterprises must understand current and future risks to appropriately invest in protecting their assets.
5. **Investments:** Evaluating the state of the IT market aids companies in determining where best to allocate funds. This could be investments in new technologies, partnerships, or even mergers and acquisitions.
6. **Regulatory Environment:** In some countries, regulations can significantly impact IT businesses. Assessing these trends is crucial for understanding potential limitations or requirements.
7. **Consumer Expectations:** The technological habits of consumers shift at the pace of the introduction of new technologies. Understanding these changes assists companies in adapting to the evolving needs of consumers.

Considering all these aspects, it's imperative for businesses to systematically analyze the state of the IT market in order to make appropriate strategic decisions and adequately forecast the future.

According to data from the IT Ukraine Association (IT Ukraine Association, 2022), the IT industry remains the sole export sector of Ukraine that operates fully during wartime, holding the country's economic front, actively assisting the military, and supporting a strong volunteer movement.

In the first ten months of 2022, the IT sector brought 6 billion US dollars of export revenue to Ukraine's economy and achieved a 10% growth compared to the previous year. Such outcomes were made possible due to the effective implementation of business continuity plans, timely team relocations, and diversification of development centers both within Ukraine and abroad.

IT companies continue to operate and execute projects even during blackouts, pay taxes promptly, expand their presence in the global market, and attract new clients. It is precisely because of these unique skills and experience that the Ukrainian IT sector has the potential to become the primary driver of Ukraine's reconstruction after the end of the war.

As of the 1st and 2nd quarters of 2023, the IT market in Ukraine has begun to experience losses related both to the war and to economic fluctuations in the global information technology market. Specifically, according to data from the Lviv IT Cluster, as of January 2023, the volume of IT exports fell by 29.7% compared to the corresponding figure in 2022 (Lviv IT Cluster, 2023). With the current market development trend, by the end of 2023, the IT market may show a decline in the annual volume of exports for the first time in its history compared to previous years.

However, long-term market trends indicate a relatively high probability of a transition to growth starting from the 1st quarter of 2024. Nevertheless, this growth will depend on a number of factors, namely:

1. The overall state of the Ukrainian and global economy;
2. The government's resolution of the issues of military conscription and the emigration of IT professionals;
3. The quantitative and qualitative distribution of the expertise of professionals in the labor market;
4. The consistent enrollment of students in higher education institutions, which will ensure further growth of the IT industry over the next 3-4 years;
5. Tax incentives for the IT sector.

The Ukrainian IT market is inextricably linked to the global IT market. The general trends of the global IT market are somewhat different and have a number of pronounced trends.

According to IDC (IDC, 2023), the global IT market, based on the results of 2022, grew to a volume of \$1.13 trillion USD, with an expected growth to \$1.2 trillion USD in 2023 (or 5.7% annually, which is a quite high indicator for the global market). Thus, the global market continues its growth trend, despite layoffs in US tech giants (The Economic Times, 2023), crisis phenomena in the Indian IT segment market (Sneha Saha, 2023), and the general caution of investors. The venture capital market shows prospects for growth, which means the overall growth of the IT industry thanks to active investments both at the startup level and in terms of improving financial indicators among medium and large tech companies.

In addition to the cautiously optimistic financial forecast, IT markets have a number of technological trends that will determine the further development of the industry globally, particularly in Ukraine.

According to Forbes analysts, in 2023, the following technological trends will be of utmost relevance for the IT industry (Bernard Marr, 2022):

1. Ubiquitous Implementation of Artificial Intelligence (AI): The widespread integration of AI and advanced information technology in various sectors is anticipated. This includes the traditional uses of AI and its integration in more advanced forms, like predictive analysis, neural networks, and machine learning.
2. Rise of Virtual (VR) and Augmented Reality (AR) Technologies: These technologies are expected to grow exponentially, affecting sectors from gaming to healthcare and education, offering more immersive experiences and reshaping the way we interact with digital information.
3. Active Development of WEB3 and Blockchain Technology: The decentralized web, or WEB3, will offer a new way of using the internet, ensuring data privacy, and creating decentralized applications. Alongside this, blockchain technology, which underpins cryptocurrencies, will find more applications in areas such as supply chain, contract management, and identity verification.
4. Active Integration of the Physical and Digital World: The lines between the physical and digital world will blur, especially with technologies like the Internet of Things (IoT). Devices will increasingly communicate with each other, gathering data, and automating processes without human intervention.
5. Progress in Quantum Computing: Quantum computing, which operates fundamentally differently from classical computing, promises to revolutionize industries by solving problems deemed unsolvable before. They'll be especially influential in fields like cryptography, medicine, and financial modeling.
6. Autonomization and Automation of Business Processes: The automation of business operations, especially with the aid of intelligent information technologies, will become a staple. This not only streamlines operations but also increases efficiency, accuracy, and productivity.

For Ukraine, aligning with these global trends can offer immense opportunities. Investing in research and development in these areas, updating educational curriculums to supply the industry with

skilled professionals, and creating a favorable regulatory environment for tech startups can position the country as a prominent player in the global IT landscape.

Considering the state of the Ukrainian and global IT markets, as well as current economic and technological trends, it can be concluded that Intelligent Information Technologies (IIT) will continue to play a critically important role in the modern digital world, especially in the context of automated decision-making processes in IT company personnel management. Here are several arguments in favor of this:

1. **Adaptability to Change:** With the constant evolution and shifts in technological trends, IIT will aid human resource managers in keeping track of the skills and competencies of employees, anticipating needs for training or adaptation to new introductions.

2. **Efficient Recruitment:** Using IIT, hiring systems can analyze data to identify the most suitable candidates, relying on algorithms that study information flows and analyze previous choices and their effectiveness.

3. **Data Exchange and Forecasting in WEB3:** In the context of WEB3 and blockchain technologies, IIT can ensure uninterrupted data exchange across different platforms and automate the forecasting of needs in resources, training, and personnel development.

4. **Skill Identification for VR and AR:** With the rise of virtual and augmented reality technologies, IT companies require specialists with relevant skills. IIT can assist in identifying and developing these skills among existing personnel.

5. **Quick Response to Technological Progress:** As technology progresses, managers need to respond quickly to changes. IIT can automate many aspects of the decision-making process, providing managers with real-time access to relevant information.

6. **Employee Satisfaction and Productivity:** Intelligent systems can help companies identify the needs of employees, their professional growth, and job satisfaction, contributing to increased overall productivity.

Given the above, it becomes clear that the development and implementation of Intelligent Information Technologies in the personnel management processes of IT companies is a key element that will help maintain competitiveness and innovation in a dynamic technological world.

The labor market in the field of information technology has several distinctive features that set it apart from other labor markets:

1. **High Dynamism:** Technologies change rapidly, and the requirements for IT professionals constantly adapt. This demands constant learning and self-improvement from specialists.

2. **Skilled Labor Shortage:** The high demand for IT professionals in many countries leads to a shortage of highly skilled workers, which can drive up salaries in this sector.

3. **Employment Flexibility:** IT professionals often have the option to work remotely, freelance, or follow a flexible schedule.

4. **Global Nature:** Thanks to remote work and globalization, IT specialists can work for companies located in other countries.

5. **Wide Range of Specializations:** From programming to cybersecurity, from data analytics to design – the IT field offers a vast range of specializations.

6. **High-Income Levels:** In many countries, IT professionals receive higher salaries compared to many other professions.

7. **Startup Boom:** The IT industry is known for its startup culture, where small teams can develop innovative products and quickly attract investment.

8. **Importance of Soft Skills:** Despite the technical nature of the profession, soft skills such as communication, critical thinking, and the ability to work in a team are becoming increasingly crucial.

9. Strong Corporate Culture: Many IT companies emphasize creating a positive corporate culture to attract and retain talent.

10. Continuous Growth and Continuous Learning: As technologies evolve continually, IT professionals must be ready for ongoing learning and adaptation to new tools and approaches.

These features not only shape the nature of IT employment but also provide insights into what IT professionals should expect and how companies can remain competitive in attracting and retaining top talent.

Let's analyze the Ukrainian job market in the IT sector, using data from the most prominent IT resource in Ukraine – Dou.UA.

As of April 2023, the IT job market displays several significant trends. According to Dou, the overall number of job vacancies has decreased. However, compared to the previous year, there has been an increase in non-technical positions, especially for beginners. Meanwhile, competition among candidates has been on the rise for a year and is at an all-time high. Interestingly, more than half of the 20 most active companies in April are product-based.

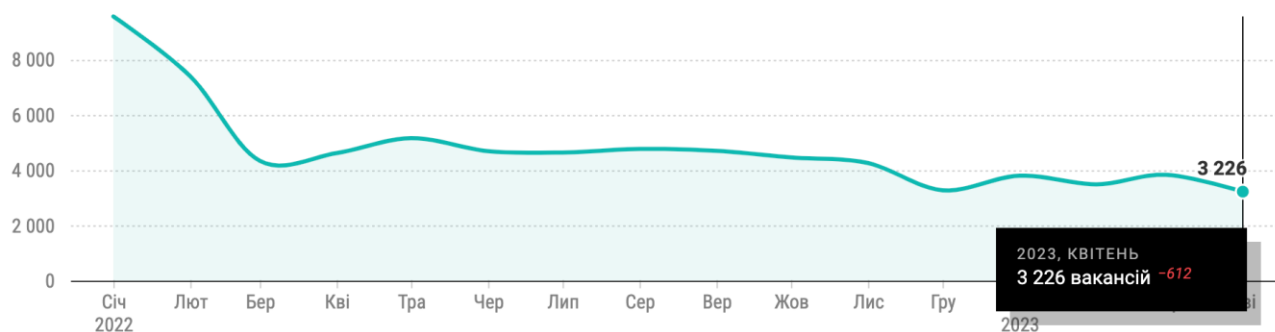


Fig. 1. Total number of vacancies on jobs.dou.ua from January 2022 to April 2023

Source: based on materials from dou.ua

As we can see from the chart presented in Fig. 1, the overall number of job vacancies on jobs.dou.ua from January 2022 to April 2023 has decreased by more than half. The primary decline is observed from mid-January 2022, influenced by sociopolitical and economic events triggered by the large-scale invasion of the Russian Federation into Ukraine.

Throughout 2022, there is a generally stable trend, with a slight tendency to further decline and seasonal fluctuations, caused by the periods of New Year-Christmas holidays and the end of the fiscal year in Western countries. This leads to the usual seasonal business slowdown during these periods, and consequently a seasonal decrease in specialist engagements.

We will also analyze the reverse metric, namely the average number of responses per vacancy, from January 2022 to April 2023 based on Dou.ua statistics.

As of January 2022, the average number of responses per vacancy was 5 candidates. By April 2023, this indicator reached 28.49 candidates per vacancy, which is an absolute record for the entire period of statistics tracking.

As we can see from Fig. 2 – the statistics indicate a steady trend towards increasing competition in the IT labor market.

Several factors contribute to the increase in competition, specifically:

- The trend towards a decrease in the number of vacancies;
- Risks of ceasing to engage specialists for new projects by foreign companies and diversifying team composition by tapping into labor markets in Asia, Africa, and South America;
- Risks of ending collaboration with Ukrainian professionals on existing projects and diversifying team composition through labor markets in Asia, Africa, and South America;
- Risks related to the peculiarities of employing specialists during martial law;
- Potential risks of changes in taxation rules;
- Risks associated with the slowdown in startup growth due to the decreased intensity of venture investing in Western markets;
- Workforce reduction by technology giants and saturation of local labor markets;
- Implementation of artificial intelligence and neural networks, and the substitution of certain operations previously requiring specialist labor by artificial intelligence tasks.

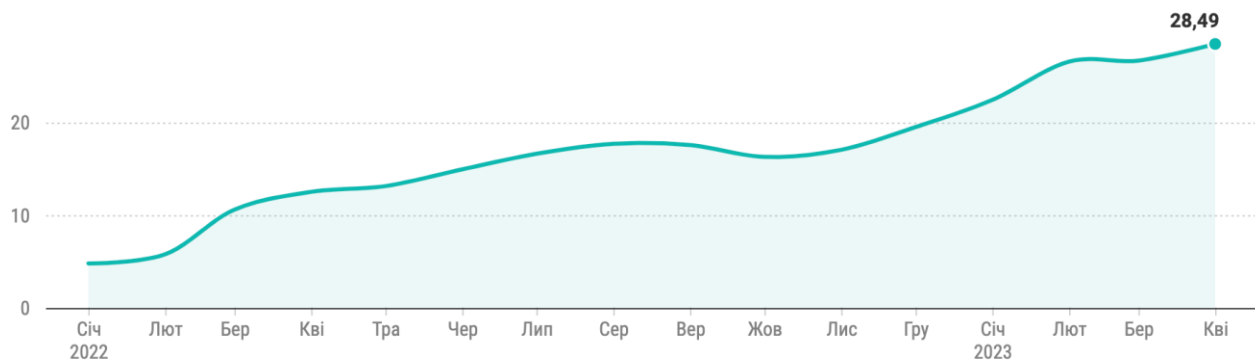


Fig. 2. Average number of responses per vacancy, trend from January 2022 to April 2023

Source: based on materials from dou.ua

When examining the competition statistics in the IT labor market according to Dou.ua data, broken down by technology sectors, one can conclude about the heterogeneity of the competition level (Fig. 3).

As we can see from Fig. 3, almost every technical sector shows an increase in competition, which is quite substantial and varies by percentages or tens of percentages. The situation appears critical in terms of competition for the quality assurance and testing sector (with an increase of 112.7%), project management (with an increase of 50.7%), and design (38%). For the rest of the sectors in the technical stack, there is a negative trend toward increased competition, however, it ranges from 2.5% to 23.8%.

The overall trend indicates a further intensification of competition in almost all technical sectors.

The statistics provided by Dou.ua are also confirmed by reports from the National Institute for Strategic Studies (NISS, 2023), which indicate the validity of the analysis conducted and allow us to determine the general trends for the industry.

Systematizing all the statistics and analysis provided, we can make several conclusions:

- The labor market in the information technology sector is in a crisis, with a trend of continuity and deepening in the short to medium term.

- There is a clear trend towards a decrease in the number of technological vacancies.

- There is a clear trend towards increased competition in the field of technological vacancies.

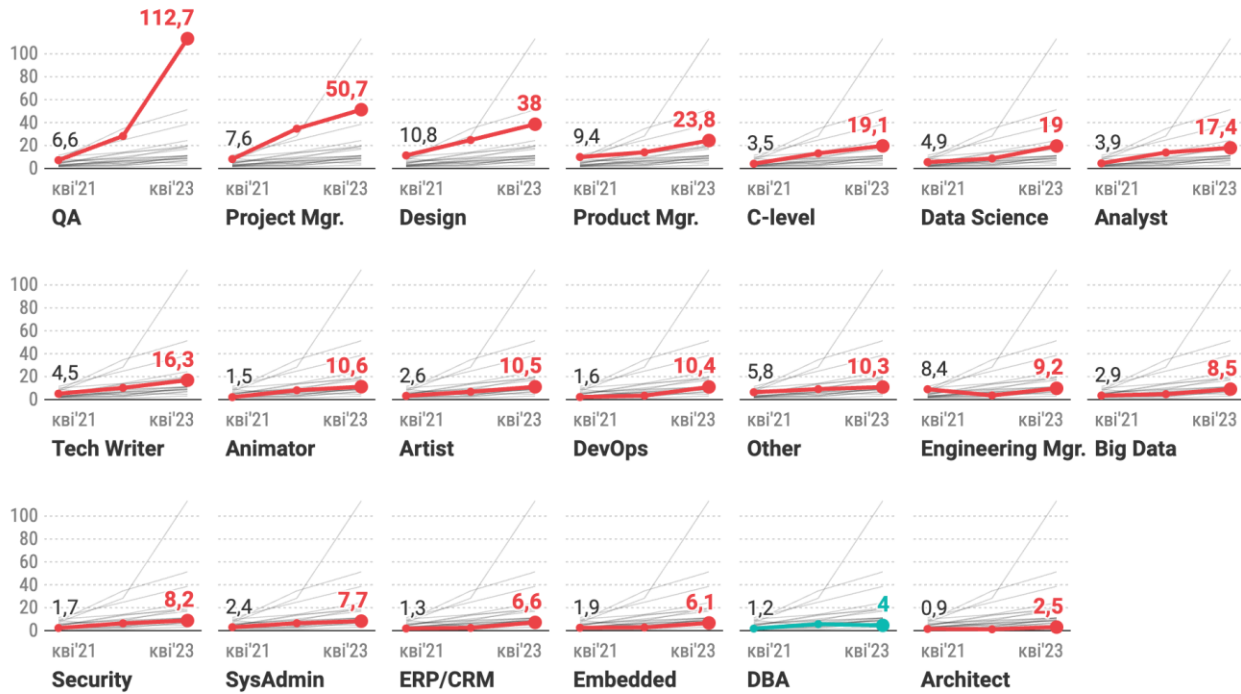


Fig. 3. Average number of responses per vacancy in April 2021, 2022, and 2023, broken down by technical positions

Source: based on materials from dou.ua

The above conclusions indicate that the Ukrainian IT market is in a state of temporary stagnation, which dictates a consistent need to develop intellectual information technologies for automating decision-making in IT company personnel management processes. Developing and implementing such technologies will reduce costs for personnel management processes, reduce the likelihood of ineffective or erroneous managerial decisions, and ensure effective team management to ensure the maximum quality of project implementation, which significantly increases the chances of IT companies' survival under temporary crisis conditions.

Upon market stabilization, the use of intellectual information technologies for automating decision-making in IT company personnel management processes will become even more relevant, as it can improve the company's operational indicators due to a high level of operational efficiency and the effectiveness of managerial decisions.

Indeed, during the hiring process of IT professionals, companies face a series of challenges and issues that can be characterized from a scientific perspective:

- **Skills Gap:** With the rapid development of information technology and the constant emergence of new technologies and tools, there is a gap between the knowledge and skills required in the market and what professionals can offer.

- **Objective Competence Assessment:** The lack of standardized methodologies or tools for assessing candidates' technical knowledge and skills complicates the selection process.

- Cultural Fit: IT companies have their own unique corporate culture. Determining a candidate's compatibility with this culture is challenging, as mismatches can lead to conflicts and reduced productivity.

- High Competition: The IT industry is attractive to many talented professionals, so companies often compete for the best among them, offering competitive benefit packages.

- Complexity of Forecasting Needs: With the rapid development of technologies, companies may find they need specialists in new areas previously not considered priorities.

- Remote Work: Due to globalization, remote work has become widespread. This introduced additional challenges in terms of management, communication, and maintaining corporate culture.

- Changing Interests: Young IT professionals often seek opportunities for self-realization, and project and technology changes, which can lead to higher staff turnover.

- Budgetary Constraints: Despite the high demand for IT professionals, companies may have budgetary constraints that complicate hiring highly skilled specialists.

Addressing these issues requires a comprehensive approach, including innovative HR technologies, continuous training of the IT team, and creating an environment conducive to professional growth.

Using intelligent information technologies in the HR field opens up new horizons for optimizing hiring processes and personnel management. Let's delve deeper into the prospects of using these technologies to address the aforementioned challenges:

- Skills Gap: Artificial Intelligence (AI) can analyze market trends and predict needs in specific skills. This allows companies to plan training and development programs in advance.

- Objective Competence Assessment: Intelligent systems can automate the process of evaluating candidates by analyzing their resumes, conducting online tests, or even assessing their responses during video interviews.

- Cultural Fit: Modern systems utilizing data analysis and machine learning can help determine which candidates best fit the corporate culture.

- High Competition: Recommendation systems can identify potential candidates who aren't actively job-seeking but may be interested in offers.

- Complexity of Forecasting Needs: Intelligent data analysis can detect shifts in technological trends, allowing HR managers to anticipate future needs.

- Remote Work: Intelligent tools can automate the management of remote work, including productivity tracking, communication platforms, and team integration.

- Changing Interests: Intelligent systems can analyze trends in employee satisfaction and career interests to offer them new opportunities and projects.

- Budgetary Constraints: Budget optimization using data analytics can help HR departments maximize the return on investment in personnel.

In conclusion, intelligent information technologies can significantly optimize the IT professionals hiring process, making it more accurate, efficient, and responsive to modern market challenges. Applying these technologies will allow companies to find the best candidates, adapt to changing market conditions, and maintain high team productivity.

In the context of a globalized and dynamic information technology market, hiring processes become key to securing competitive advantages for IT companies. Intelligent information technologies offer cutting-edge approaches to optimizing and refining these processes.

The importance of using intelligent technologies in the hiring process can be outlined as:

- Objectivization of Selection Processes: Applying machine learning algorithms allows for more objective selection criteria, reducing the influence of subjective factors.

- Forecasting and Strategic Planning*: Artificial Intelligence can analyze vast data sets, identify trends, and predict future personnel needs.
- Efficiency and Speed: Automated systems can perform initial candidate screening, significantly reducing the time spent on the recruitment process.
- Access to Global Talent: Intelligent systems can track and analyze candidate data from around the world, providing access to top global talents.

How this benefits IT companies:

- Competitive Advantage: The ability to quickly and efficiently recruit highly qualified professionals is a key component of any IT company's success.
- Resource Optimization: Reducing expenses on unproductive interviews and unsuccessful hires allows companies to focus resources on strategic tasks.
- Ensuring Flexibility: In a world where technological needs change rapidly, the ability to swiftly adjust a team to current tasks is crucial.
- Increasing Employee Satisfaction: Proper candidate selection contributes to building a cohesive, productive team and enhancing the overall corporate culture.

Thus, using intelligent information technologies in hiring processes not only amplifies the efficiency of these procedures but also grants IT companies strategic advantages in a competitive technological environment.

The role of intelligent information systems in the context of managing the development of IT professionals within IT companies is immensely significant. Let's consider the key aspects of this role based on a scientific approach:

Diagnosis and Needs Analysis: Intelligent systems provide in-depth data analysis about professionals, identifying their current qualification level, needs in training, and professional growth.

Personalized Learning: Based on data and predictive models, intelligent systems can recommend individual developmental paths for each professional, considering their specific characteristics and needs.

Monitoring and Evaluating Effectiveness: With the aid of automated analytical tools, companies can track the progress of their professionals and evaluate the effectiveness of implemented development programs.

Career Growth Forecasting: Intelligent information systems can utilize historical data, as well as current market trends, to predict the potential career advancement of IT professionals, assisting in forming a long-term personnel development strategy.

Integration with Other Corporate Systems: The capability of intelligent systems to integrate with other business processes of the company enables the creation of a coordinated talent management and development ecosystem.

In conclusion, intelligent information systems have become critically important tools in managing the development of IT professionals in modern IT companies. They facilitate the optimization of learning processes, tracking progress, and supporting strategic personnel development in an environment of constant technological change.

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1.2. INNOVATIVE EDUCATIONAL TECHNOLOGIES IN THE PROFESSIONAL TRAINING OF SPECIALISTS: MODERN ASPECTS

The standards of the new generation define the introduction of innovative educational technologies as the number one task in the context of the modernization of the system of higher professional education. With the increase in the amount of information, the expansion of the scale of human activity, and the construction of an innovative economy, the need for methods that contribute to the training of specialists who can quickly perceive any innovations in education and exist productively in rapidly changing conditions is growing. The new standards force the use of such types of classes in which the teacher stimulates students' thinking, their ability to put forward hypotheses, arguments. The search for new means leads to the understanding that a modern vocational school needs innovative educational technologies.

Taking into account the transition to a global information society and a knowledge society, we can talk about the correspondence of education to the socio-economic needs of the present and future only if its modernization is based not only and not so much on organizational innovations, but on changes in essence: in the content and technologies of personnel training and the peculiarities of the organization of scientific research. As a social institution that reproduces the intellectual potential of the country, education should have the ability for anticipatory development, meet the interests of society, a specific individual and a potential employer.

Therefore, the implementation of an innovative approach to the organization of the educational process has become one of the relevant areas of activity of the Higher Education Institution.

General problems of introducing innovations in education were studied by I. Pidlasy, O. Savchenko and others.

E. Kryukova, O. Ameridze considered various aspects of the implementation of innovative technologies in institutions of higher education. I. Dychkivska, A. Kiktenko, O. Lyubarska, O. Pehota and others. studied methods and ways of organizing innovative educational activities.

The introduction of information and communication innovations into the educational process of higher education institutions was the subject of scientific investigations by R. Gurevich, M. Kademia, M. Kozyar and others.

The specificity of interactive learning as a characteristic feature of innovative technologies was studied by O. Pometun, L. Pyrozhenko, O. Sysoeva, and others.

At the same time, modern aspects of the use of innovative educational technologies in the process of professional training of specialists are insufficiently researched in the scientific literature.

The analysis of scientific literature shows that, in a general sense, innovation is the final result of innovative activity, embodied as a new or improved product, a new or improved technological process. Innovation is understood not only as the creation and spread of innovations, but as changes that are of a significant nature, accompanied by changes in the content of activities and thinking styles.

In modern literature devoted to innovative education, the complexity and multifacetedness of this phenomenon is noted. M. Lysenko interprets innovation as a term for a new concept, rules, methods, etc. The scientist notes that in the pedagogical interpretation, innovation means an innovation that improves the effect and results of the educational process (Lysenko, 2013).

L. Shevchenko considers educational innovations as: "...any targeted activity, organizational decision, system, procedure or method of carrying out educational activities, which differ significantly

from established practice and are used for the first time in a given organization and are aimed at increasing the level of efficiency of the organization's functioning and development in conditions of competition" (Shevchenko, 2013). Among others, the author refers to them scientific and methodological innovations and educational and technological innovations, which involve updating the content of education and educational and methodological support, improving educational technologies (Shevchenko, 2013).

O. Latukha, in turn, singles out three types of innovative activity of higher education institutions: implementation of fundamental and practical-applied research, creation of innovations and complex innovative projects; formation of the personality of a specialist capable of perceiving, implementing and creating an innovative product; development and introduction of innovative forms, methods and technologies in educational activities traditional for universities. The goal of innovative activity is a qualitative change in personality compared to the traditional system. Innovative activity in education as a socially significant practice aimed at the moral self-improvement of a person is important because it can ensure the transformation of all existing types of practices in society. This becomes possible thanks to the introduction of innovative didactic and educational programs into professional activity, which contributes to solving the pedagogical crisis. The development of the ability to motivate actions, to independently navigate the received information, the formation of creative non-standard thinking, development due to the maximum disclosure of natural abilities are the main goals of innovative activity.

The model of innovative education in higher education, developed by P. Kozak, conceptually develops the idea of the content essence of the types of innovative activity identified by O. Latukha and provides for "active participation of the student in the learning process (and not passive assimilation of information); possibilities of applying knowledge in real conditions; the use of concepts and knowledge in a wide variety of forms, not only in text form; an approach to learning as a collective rather than an individual activity; emphasis on the learning process, not on memorizing information" (Kozak, 2014).

"Innovative learning, as justified by R. Gurevich, M. Kademiya, M. Kozyar, involves the implementation of modern learning models:

- e-learning (electronic learning),
- m-learning (mobile learning),
- blended learning (mixed learning),
- flipped-learning (inverted learning),

- ubiquitous learning (pervasive learning); as well as the introduction of innovative forms of training, first of all, distance learning using the Internet and special online programs, educational platforms and intelligent educational systems" (Gurevich, 2012).

And this, accordingly, "conditions the use of innovative information technology. In particular, such as: case technologies, television technologies, video conferences, webinars, Skype lectures, multimedia presentations, video lessons, computer games, computer testing, simulation of situations, etc. (Gurevich, 2012).

D. Dzvinchuk, V. Dovgan, O. Kryukov, O. Radchenko, as a result of the analysis of scientific literature on the subject of determining trends in the global development of education informatization, singled out the following:

- "the emergence of technologies capable of significantly diversifying teaching methods, which makes it possible to significantly improve the quality of education;
- combination of classical principles of fundamental training with effective modern innovative educational models;
- introduction of new means and methods of training, focused on the use of information technologies;

- creation of a system of anticipatory education;
- modification of the content of the teacher's activities, which involves a high level of appropriate training and the creation of a powerful information infrastructure with a developed information and computer educational environment in higher educational institutions;
- the need for a creative approach to learning: new knowledge should be created together, and not simply "transmitted" to the listener from the lecturer;
- a global approach to learning – common interests, curiosity and desire to learn contribute to the expansion of the own boundaries of those who study;
- global mobility;
- shift of the main emphasis from the assimilation of significant amounts of information, accumulated on reserve, to mastering methods of continuous acquisition of new knowledge and acquiring the ability to learn independently" and others (Makarenko, 2020).

D. Dzvinchuk, V. Dovgan, O. Kryukov, O. Radchenko emphasize that "the introduction of information and computer technologies in Ukraine should take place at an anticipatory pace and at the same time in all links of the educational process: from preschool education to the training of scientific personnel and "universities of the third age. The main task of informatization of education is to create conditions where mastery of information and computer technologies becomes the main competence requirement for every person at certain stages of his life" (Makarenko, 2020).

In the most general sense, pedagogical technology is defined as "a systematic method of creation, application and determination of the entire process of teaching and assimilation of knowledge, taking into account technical and human resources and their interaction, which considers the optimization of forms of education as its task" (UNESCO, Vocational and Technical Education Dictionary) (Makarenko, 2020).

I. Dychkivska interprets innovative pedagogical technology as "a purposeful, systematic and consistent introduction into practice of original, innovative methods, methods of pedagogical actions and means, covering the whole educational process from the determination of its purpose to the expected results"; as "a set of radically new or improved forms, methods and means of teaching, education and management united by a single goal (Makarenko, 2020).

Innovative educational technology – educational technology based on the use of innovative educational methods.

In pedagogical science, three types of innovative educational technologies are conditionally distinguished: – radical; – combined; – modified. Their conceptual basis is interactive learning methods, focused on the development of students' thinking, formation of decision-making skills in non-standard situations.

In particular, the use of information technologies in the educational process contributes to: – the development of skills in finding the necessary information, its processing, analysis, modification, transformation, storage and transmission in any possible form (presentation, video, audio file, text, image, etc.); – formation and development of creative abilities of students; – more accessible and continuous education, since information technologies allow you to get education remotely, having the opportunity to study and improve your qualifications at any convenient time; – opportunities for students to choose the most convenient and effective learning trajectory for them; – formation of a unified educational environment of the region-region-country and even the world; – implementation of personally-oriented training in the educational process; – activation of cognitive activity of subjects in the educational process; – expanding the possibilities of organizing the educational process of students by conducting classes in virtual classrooms, laboratories, etc.

Today, the following options for the application of information technologies in the professional training of students are actively practiced:

1. Electronic training. With the appearance of this term in pedagogy, it was meant that training will take place with the use of computer tools, that is, training according to the student-computer scheme. But the rapid development of technology has changed this concept. It became wider and as a result was divided into two different concepts: synchronous and asynchronous distance learning technologies. Asynchronous learning technology is a learning technology in which the student independently works with educational materials located on the Internet or contained on various external media, such as: CD and DVD discs, USB flash cards, hard drives, etc. The student builds his learning process independently depending on his own characteristics and preferences, time to master this or that material, topic or discipline. Synchronous learning technology is a learning technology in which the learning process between a student and a teacher takes place online in real time.

This type of training involves individual (with the participation of a student and a teacher) and group (several students and one teacher) classes. Classes are usually held via video link using webcams that broadcast images of all subjects of the educational process. To provide this type of training, special software is needed, Zoom and Google Meet are the most used today.

K. Bugaichuk summarizes that "e-Learning is learning with the help of electronic devices, in which all information is provided in electronic form. E-learning can use the Internet for content delivery and participant interaction (or maybe not – this is a "classic" e-course)" (Bugaichuk, 2014).

2. Distance learning technologies. Distance learning is a synthesis of interactive self-learning and intensive consulting support. Such training can be considered one of the tools of distance education. Distance learning is a set of technologies that provide interactive interaction between students and teachers in the learning process. The delivery of manuals can be carried out without the participation of computers and the Internet.

Distance education has many advantages, and one of them is the opportunity to learn, find work and develop their creative abilities for people with disabilities and in various life situations.

That is, as K. Bugaichuk emphasizes, "the concept of e-learning is broader and involves the use of electronic means for learning in various forms of education (full-time, part-time) in the process of professional development, during the period of independent work of cadets and trainees. Distance learning occurs when the participants of the educational process are distant from the teacher and from each other and interact with each other using electronic means in synchronous and asynchronous modes (e-mail, forums, social networks, social services, webinars, etc.)" (Bugaichuk, 2014).

It should be noted that the combination of online and offline elements allows to make training effective, economical and convenient, and the educational process interactive, person-oriented and adaptive. At the same time, notes I. Nagayeva, there are a number of reasons for ineffective use of distance and electronic learning technologies:

- lack of effective management tools;
- lack of funds for the development of educational content;
- lack of pedagogical personnel in the field of distance learning technologies;
- specificity of training;
- lack of modern teaching aids;
- inadequate technical and software support of students;
- lagging educational programs from real life, etc.

The experience of using information technologies has also revealed some disadvantages of this process. In particular: – most educational materials created for traditional learning are not suitable for use in online or blended learning; – students, studying only with the help of information technologies (remotely), do not get the opportunity to form the necessary skills that are developed at lectures and seminars; – the need for special training of teachers to work with new technologies; – the need to equip the educational institution with computer equipment and software that require constant updating; – lack

of an incentive system for participation in improving the quality of the education process, mastering new principles of teaching with the use of distance educational technologies; – problems of developing skills for working with information systems in all participants of the educational process.

O. Slushnyi proves that "various innovative pedagogical methods are successfully used in the educational process, the basis of which is interactivity and maximum proximity to the real professional activity of the future specialist, including: simulation technologies (game and discussion forms of organization); "case method" technology (maximum approximation to reality); video training method (maximum approximation to reality); computer modeling; interactive technologies; technologies of collective and group training; technologies of situational modeling; technologies for processing debatable issues; project technology; Information Technology; differentiated learning technologies; text-centric learning technology and others" (Slushny, 2021).

Let's dwell in more detail on case technology and project technology. The name of case technology comes from the English word "case" – folder, suitcase, briefcase, "case" can also be translated as "case, situation". E. Lane and D. Distefano interpret a case as a situation considered by a person for the purpose of making a decision (Lane, 1992).

Using the case method has clear advantages over a simple presentation of the material. Its tasks differ from those used during seminars and practical classes. Such training gives students the opportunity to acquire a wider range of skills. Analyzing the cases, students receive a ready-made solution that can be applied in similar circumstances. Increasing such experience in the student will allow him to increase the probability of using a ready-made scheme of solutions to the existing situation, will form skills for solving more serious problems.

There are many types of cases. They are classified according to different characteristics. One of the most used classification approaches is complexity. At the same time, illustrative educational situations are distinguished (teaching a student of a decision-making algorithm); educational situations-cases with the formation of a problem (a task and a clearly formulated problem are highlighted for the student to diagnose the situation and make an independent solution); educational situations-cases without formulation of the problem (for self-identification of the problem and proposal of one's version of its solution). His idea is that the creative acquisition of knowledge, abilities and skills takes place in the active position of the student.

In order for the case to be effective, it must: – be informative (contain plot and actual material); – focus on a topic that arouses interest among students, for example, "Advantages and disadvantages of blended learning"; – raise current issues; – to form decision-making skills.

The most common methods of case technologies are situational analysis and its varieties: analysis of specific situations; situational tasks and exercises; case-study or the method of specific educational situations (Osina, 2018).

Project learning technology occupies a special place in the professional and creative development of students. During the implementation of this technology, students, together with the teacher, project any professionally mediated problem-semantic situation related to the content of the studied subject or future activity, and then independently resolve the contradictions inherent in it. An important advantage of this technology is its focus on the formation of value-meaning thinking of the student, his ability to find answers to important professional-meaning questions of a moral, ethical, aesthetic nature, as well as on the formation of the ability to present the results of activity (Melashenko, 2006).

The main requirements for project-based learning technology are: – a significant theoretical, technical and research task, the solution of which will lead to the creation of a certain product; – the idea being developed must be distinguished by its novelty; – project results must be presented at an exhibition, conference or seminar; – the developed project must have the possibility of continuation for commercialization.

Project technology involves: – the presence of a problem that must be solved with the help of existing knowledge; – independence of the student when performing work; – the student's structuring of his project with an indication of the achieved results at each stage; – collection of information, its study, systematization and protection.

The development of interdisciplinary research and creative projects aimed at the synthesis of disparate knowledge from various fields of science, the selection of important information, the ability to conduct a discussion, express one's point of view involves obtaining interdisciplinary results that are distinguished by theoretical novelty and have practical significance.

V. Kharlamenko emphasizes that "the implementation of active interaction between teachers and students in the process of organizing individual, personal-group, group and collective work in the conditions of cooperation built on the positions of subject-subject relations allows to form additional motivation aimed at mastering professionally – significant information and its creative implementation in practical activity" (Makarenko, 2020).

When organizing such interactive training, it is necessary to create pedagogical conditions in higher education institutions, under which there will be productive interaction of the subjects of the educational process, exchange of information, joint modeling of situations, assessment of one's own behavior and the actions of others, immersion in a real atmosphere of business cooperation to solve a specific educational task.

The use of interactive forms of learning contributes to the effective assimilation of educational material, the formation and development of students' informational and communicative competence, as well as the formation of professional skills. A graduate of a higher education institution should be able to find and analyze/summarize information, argue his point of view, and make informed decisions.

Thus, as S. Sysoeva summarizes, "during interactive learning, all students of the educational process interact with each other, exchange information, jointly write down problems, model situations, evaluate the actions of colleagues and their own behavior, for entering into the general atmosphere of business cooperation with the connection of a number of problem according to their interests, needs and requests" (Sysoeva, 2011). Therefore, in the process of using interactive forms of education, metadisciplinary results based on logical operations of thinking are achieved.

The modern structure of the educational process of the educational institution involves the inclusion of academic and innovative learning models, traditional and interactive forms of interaction of the participants of the educational process in real and virtual space. The unified information and educational environment of the educational institution involves the implementation of the integration of electronic educational information resources of departments, faculties and departments, personal sites and/or blogs of employees of the educational institution, as well as the creation of virtual departments and departments, the organization and holding of virtual Olympiads.

It is obvious that the application of educational innovations requires organizational, research and methodical work on the training and retraining of teachers and employees.

The above provides grounds for asserting that the use of innovative educational technologies contributes to the realization of the principle of equal opportunities in obtaining an education, and also has the following advantages:

- increasing the number of people who will have access to quality education;
- ensuring a new level of social and professional mobility;
- ensuring effective training management;
- promotion of students' mastering of modern means of work organization and communications;
- socialization and adaptation in modern conditions.

Therefore, it is advisable to pay special attention to the following main areas of application of innovative educational technologies:

- blended learning: integration of electronic and traditional learning;
- mobile learning: technologies that allow organizing the learning process using mobile communication devices, such as mobile phones and communicators;
- gamification: the process of using game thinking and game dynamics to attract the audience and solve problems;
- creation of network communities as communities of practice: the connecting objects are the materials of digital collections and informational applications that ensure the collective use of these materials for educational purposes;
- edutainment: introduction of game practices into traditional formats of the educational process;
- visualization (visualis): methods of presenting information in a form convenient for visual observation and analysis.

And also: – formation and placement in open access of educational resources for collective use; – building a system of anticipatory professional retraining of citizens; – creation of a single educational space; – effective use of scientific and pedagogical potential; – provision of computer equipment and access to the global network.

So, at the current stage, the fact that the traditional school, focused on the transfer of knowledge, abilities and skills, is not keeping up with the pace of their growth is becoming more and more obvious. Innovation is vital to increase the effectiveness of education. The need to make innovative changes in the professional training of students is due to the fact that today future specialists need not only deep knowledge, but also the ability to navigate in a rapidly changing situation, acquire new knowledge and use it to design their own professional activities.

Innovations are innovations that contribute to the improvement of the quality of the educational process, and actively implemented innovative educational technologies make it possible to intensify the forms and methods of traditional approaches to education, expand the possibilities of modernizing the training of future specialists. The priority innovations are the formation of students' innovative thinking, the implementation of information technology achievements in the educational process, the use of artificial intelligence in educational activities, the transition to didactic engineering.

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1.3. INDIVIDUALIZATION OF THE PROCESS OF PROFESSIONAL TRAINING OF FUTURE SPECIALISTS USING INNOVATIVE EDUCATIONAL TECHNOLOGIES

An attribute of modern society is dynamism and modernization. At the conceptual level, modernization processes characterize changes in both the strategy of socio-economic development, taking into account its restructuring and globalization, and the situation on the labor market. The definition of the concept of "modernization" emphasizes the need for: – updating the structure of higher professional education in the direction of integration and equality; – development of the conceptual foundations of content related to the enrichment of students' knowledge, the development of fundamental abilities and skills, cognitive and creative abilities; – acquiring and expanding the experience of independent activity and personal responsibility; – practice-oriented focus of the educational process on socio-cultural adaptation of graduates in the labor market.

The concept of "modernization" itself is interpreted as the process of accelerating the pace of society's development, the transition to a post-industrial, information society, as a significant expansion of the scale of intercultural interaction, and in the projection on education it characterizes a new stage of professional training of specialists: competitive, capable of making independent decisions, mobile (readiness to self-realization), dynamic (responsiveness and orientation in the socio-cultural situation), responsible. Therefore, the stable development of Ukrainian society requires innovations in all spheres, which will become the basis of its modernization. V. Shvydun notes that the task of innovative development of the educational sector of Ukraine, defined by regulatory documents, requires the education system to react in a new way, that is, to actively introduce innovations, implement fundamental changes, including flexible learning trajectories and recognition of competencies acquired outside formal educational programs (Shvydun, 2022).

At the same time, theoretical research and practical experience testify to the fact that in the traditional system of professional training, serious contradictions have arisen between the needs of professional practice, the growing requirements for the level of professional competence of a specialist and the system of predominantly passive, reproductive learning, the model of professional education, oriented mainly on the traditional knowledge paradigm teaching. The resolution of these contradictions requires the search for new forms of support for professional activities, in which each student would be "included" in active forms of classes, which, in turn, would contribute to the formation of the experience of psychological and pedagogical reflection, understanding and analysis of one's own activities by providing the maximum spectrum opportunities to improve professional activity.

Prolonged individualization of the process of professional training by means of innovative educational technologies can be one of the ways to solve this problem.

Various aspects of the problem of introducing innovation into the education system were studied by A. Boyk, V. Bondar, M. Hryshchenko, I. Dychkivska, O. Dubasenyuk, V. Kremen, O. Popova, O. Savchenko, O. Sukhomlynska, and others. The works of O. Budarny, A. Granytska, O. Kirsanov, V. Krutetsky, M. Rozhkov, I. Yakymanska, and others are devoted to the individualization of education in higher education.

There are many definitions of the concepts of "innovation" and "innovative technologies" in the scientific literature. Innovation (from Latin *in-v*, *novus*-new) means innovation. And Dychkivska interprets the analyzed concept as a purposeful change that introduces new stable elements into the

educational environment and causes the transition of the system from one state to another (Dychkivska, 2012).

In the "Encyclopedia of Education" the leading goal of innovations in education is defined as "the need to respond to the challenge of globalization transformations, environmental problems, multicultural trends in the world... It is characteristic for our time to establish the priority of innovative development of education based on the modernization of all components of the system (content, management, financing etc.)" (Kremen, 2009).

The authors of the manual "Innovations in education: integration of science and practice" understand by innovations "new teaching methods, new ways of organizing classes, as well as new personnel retraining programs focused on changing requirements for the quality of education: distance learning; creation of network structures; tutoring; creation of integrated interdisciplinary courses for training new professional groups (educational managers, experts, specialized school teachers)" (Dubasenyuk, 2014).

We believe that the peculiarities of innovations in education can be analyzed by considering them as: – mechanisms of the system's response to external changes; – factors stimulating the development of the education system; – means that determine the need for reflection of experience; – the final result of the activity, realized in the form of a new or improved product sold on the market, a new or improved technological process used in practical activity.

Let's dwell in more detail on the technological component of innovation. The purpose of the learning technology is to ensure the increase in the effectiveness of the learning process. Learning technology should be understood as an integral part of a permanent and complex activity, the purpose of which is to increase the efficiency of the joint activity of students and teachers, in which an important place belongs to technical means. That is, technology is not reduced to a few mechanical processes, it embodies a rational concept of building a learning system, the basis of which is modern means of information transmission.

V. Kozakov understands the concept of "technology" as the process of implementing a detailed system combination of methods, means, communication, relevant advanced abilities, skills, and knowledge of subjects of education, necessary to ensure the reproducibility of the results of their actions in the form of desired changes in the behavior of students or listeners, adequately defined precise goals of joint learning activity (Kozakov, 2003). That is, technology is an activity that maximally reflects the objective regularities of the subject field, and therefore ensures the best correspondence of the obtained results to the set goals for the given conditions.

The analysis of scientific literature confirms that each technology has the following characteristics: – division into interconnected stages; – coordination and step-by-step implementation of actions aimed at achieving the specified result; – the unambiguity of the procedures and operations included in the technology, which is a determining condition for achieving guaranteed results adequate to the set goal.

M. Artyushina, in turn, adds that "educational technology is a complex, systematic organization of the educational process, in which all structural components serve a common goal – the achievement of specified learning outcomes. Therefore, the scientist justifies, innovative educational technologies can be considered such educational technologies that allow comprehensive implementation of innovative educational strategies, contribute to the development of innovative properties of educational subjects (Artyushyna, 2014). We share this approach of the scientist to the interpretation of the essential and operational content of the concept of "innovative educational technology" and support the position of V. Vyshkivska, who proves that the technologicalization of the learning process through the idea of controllability (designing the learning process) through a clear definition of educational goals, the most accurate substantiation of their criteria achievement and assessment of results, the presence of

an accurate description of the conditions under which the results can be achieved, the presence of operational feedback and the possibility of step-by-step adjustment, designed to ensure its effectiveness (Vyshkivska, 2023).

Summarizing the above, innovative technologies can be defined as methods of improving the educational process using information and other technologies, the defining direction of which is taking into account the personal position of the subject of learning based on the provisions of the pedagogy of cooperation.

Innovative educational technologies orient the teacher to the use of such actions, methods and forms of organization of educational activities, in which the emphasis is placed on the cognitive activity of the subject of learning and on the formation of systemic thinking, the ability to generate ideas when solving creative tasks.

The latter is carried out through the selection of content that can be synthesized into individual programs and elective educational disciplines, as well as the development of scientific research activities of students.

V. Volodko defines the individualization of education as a system of student-teacher relations that takes into account and develops the individual characteristics of each participant. Qualities such as: independence, initiative, research or searching style of activity, creativity, confidence, work culture, etc. are gaining special development (Volodko, 2000).

A. Lozenko defines the leading advantage of individual training as the ability to fully adapt the content, methods and pace of educational activities to the characteristics of the participant in the educational process (Lozenko, 2016).

Taking into account the fact that the content and organization of the individualized educational process in the professional training system should help the student to expand the possibilities of a reasonable choice of life and professional path, it is necessary to observe the provisions of student-centeredness, which requires: – the fulfillment of the educational standard in combination with the satisfaction of the individual capabilities and interests of everyone student; – flexible response to individual and personal changes of the student by making the necessary changes to the training components; – giving students the opportunity to choose types, forms of activity and self-determination; – helping students to realize their individual capabilities and inclinations, drawing up individual training programs; – use of various methods and forms of independent work of students; – carrying out professional activities with a high degree of reflection, flexible and adaptive response to the dynamics of circumstances; – development of students' ability to set goals, project, and reflect; – construction of situations in educational and professional activities in which the student can show his individuality; – providing freedom for self-development and self-realization (Vyshkivska, 2022).

Interactive learning technology, the characteristic feature of which is activation of thinking, high level of motivation, constant interaction of participants of the educational process with the help of direct and feedback links, focus on the development of individual intellectual, professional abilities and skills, will be effective in solving the tasks. The assimilation of knowledge during the use of interactive learning takes place through intensive work of the subject with the educational material. The educational process, organized on the basis of interactive learning, involves the creation of an appropriate environment by the teacher, and the student, in turn, chooses an individual learning trajectory. At the same time, the teacher acts as an organizer of the educational environment and an assistant to the student in determining the educational trajectory, a consultant, helps to plan educational activities, performs the role of a facilitator. The student takes an active position, becomes aware of himself, his potential, his uniqueness.

It should be noted that the technology of interactive learning, built on the interaction of the subjects of the educational process, contributes to the assimilation of a large amount of educational

material by organizing purposeful productive work with it with the design of appropriate goals, which takes place based on the individual capabilities and interests of students and accounting for the social order.

In the system of higher education, the idea of individualization of education can be implemented on the condition that:

- the perspective realized by students ("do it yourself"), according to which each person has the opportunity to take an active part in his own education, which allows to strengthen the motivation to study and increase the efficiency of knowledge acquisition;
- the flexibility of the higher education system, in which the content of education and the methods of mastering knowledge and acquiring professional skills correspond to the needs or expectations of the individual, which are achieved in the system of multi-level higher education, which creates opportunities for changing specialization or obtaining several specialties during the period of study at higher education institutions;
- individual planning and design of the educational process;
- individual responsibility of the student for his achievements (implementation of internal self-control instead of external);
- dynamism related to the ability of the higher education system to quickly react when training specialists to changes in the economy, information and educational space;
- the creation of an atmosphere of co-creation between the teacher and students, which contributes to the improvement of the quality of information perception and the development of professional skills;
- formed independence.

It is obvious that the implementation of the idea of individualized training requires effective management. We believe it can be done by means of innovative educational technologies, in particular information. With their help, you can automate the teacher's educational and methodological activities, create databases with didactic material, which includes a set of personal and collective tasks (for an individual student, a group of students), organizational and methodical recommendations for the teacher, educational presentations. This makes it possible to solve the task of creating conditions for students to build, together with the teacher, an individual route of their own educational activities, drawing up a flexible plan for passing certain stages of educational work. In this case, e-learning, which is quite common today, can be effective (Shyrov, 2019).

R. Gurevich, in turn, singles out the didactic possibilities of information technologies that are most important for ensuring the individualization of learning: "modeling and visualization of information about the studied objects; interactive interaction of the user and ICT tools; storage of large volumes of information with the possibility of easy access to them; automation of the processes of computing, information search activities, as well as processing the results of an educational experiment with the possibility of multiple repetitions of a fragment or the experiment itself; automation of the processes of information and methodical support, organizational management of educational activities and control over the results of assimilation; information interaction between participants of the educational process using local and global computer networks (Gurevich, 2012). The scientist emphasizes that "the didactic possibilities of innovative information technologies contribute to the individualization of educational activities due to: variability of forms of presentation of educational content and ways of working with it; completeness and availability of additional educational materials; diversity of forms of interactive user interaction and elements of electronic educational content (Gurevich, 2012).

Such a means of introducing innovative multimedia technologies as an electronic textbook corresponds to all the specified features of the organization of educational interaction and assimilation of the content of education in the conditions of individualization of the learning process.

An electronic textbook is a comprehensive educational program system that ensures the continuity and completeness of the didactic cycle of the learning process: it provides the necessary theoretical material and ensures control of the level of knowledge, as well as implements information and search activities, simulation modeling with computer visualization and service functions; it is a software-methodical complex that provides an opportunity to learn a course or a large section of it using a computer independently or with the help of a teacher (Kademiya, 2011).

The effectiveness of the electronic textbook is that it: provides almost instant feedback; helps to quickly find the necessary information; significantly saves time when repeatedly referring to hypertext explanations; allows you to test knowledge of a certain section at a pace convenient for a particular student; can update the necessary educational information using, for example, the Internet.

The main conditions for the effective use of an electronic textbook are the presence of a hyperdictionary system and reference indexes, search tools, a convenient navigation system, for network textbooks – providing access to additional educational materials posted on the Internet, as well as the presence of a reflection block – a special block with the possibility of accumulating results reflection in the learning process, which ensures independence and active learning.

In the works of V. Usyk, it is substantiated that the electronic textbook allows you to solve the following basic tasks: individually review, study or repeat educational, methodical and informational and reference material; visually present all didactic material and visual aids (diagrams, drawings, tables, graphs, text, etc.) on the computer screen; to carry out self-monitoring of learning the content of educational topics; get information from the recommended literature; print samples of plans and methodical developments on all topics and types of classes; to reproduce materials necessary for conducting classes; receive methodical recommendations from various areas of study; to learn information about some technologies that are used in information activities and other information (Usyk, 2011).

One of the most effective technologies for the individualization of education is the technology of tutoring, which best meets the current needs of society, because the subject gets the opportunity to bring personal meanings to the educational process, see his educational and professional prospects, and construct an individual educational trajectory.

Fundamental aspects of the development of tutoring technology are presented in the works of A. Boyko, N. Demyanenko, T. Shvets, and others. Thus, N. Demyanenko notes that this technology helps the student to discover his own individual potential, to determine the trajectory of self-development as a subject of his own life activity, the ways and methods of successful personal and pedagogical self-realization and self-improvement (Demyanenko, 2009). As noted by N.M. Demyanenko, there are universal tutoring, which involves pedagogical interaction between the tutor and students, remote online and offline tutoring through the mediation of information technologies, etc. (Demyanenko, 2007). At the same time, the tutoring technology can be implemented in individual and group forms. In our opinion, the individualization of the professional training process necessitates the use of an integrated form of tutoring, because in this way students will be provided with more opportunities to realize their personal meanings and to gain experience of interaction in society.

The most common are three types of tutoring technologies, each of which offers special conditions for the co-organization of various educational offers into an individual educational program and, accordingly, sets a certain type of tutoring support:

- tutoring technology of distance education (information context), the task of which is to help the ward in building an individual educational trajectory using the skills of working in the Internet environment;

- tutoring technology of open education (social context), aimed at an adequate combination of different cultures in the individual space of civil society institutions;

- tutoring technology for supporting a student's individual educational program (anthropological context), the main purpose of which is to support the process of designing and building a student's educational program, starting from working with his primary cognitive interest, deepening this interest through educational research or projects, and up to tutoring in the field of professional educational programs.

We believe that the use of tutoring technology will also be effective in postgraduate education, which is due to its productivity in relation to the process of improving the qualifications of specialists, which is determined by the content and organizational and methodological support of training, which becomes personally oriented, the trajectories of professional development are more variable (they take into account the specifics of external and internal circumstances, professional interests of the specialist).

At the same time, it is worth emphasizing that for modern future specialists it is of particular importance to ensure the most productive transition from actual educational activity to professional activity. This requirement is satisfied by the technology of contextual learning, in which the content of the future professional activity is constructed with the help of methodical tools, the assimilation of which takes place in the same activity.

Contextual learning means learning in which, with the help of a complex system of didactic forms, methods and tools, the subject and social content of the specialist's future professional activity is modeled, and his assimilation of abstract knowledge is superimposed on the canvas of this activity. Under the conditions of such a process, learning acquires somewhat different characteristics. It acts as a form of personal activity that ensures the formation of the necessary subject-professional and social qualities of a specialist's personality. At the same time, the context acts as a meaning-making category that ensures the level of personal inclusion of the subject of learning in the stages of knowledge, mastery of professional activity.

As evidenced by the analysis of scientific literature and the experience of professional pedagogical activity, it is advisable to use the following basic technologies of personally oriented education within the framework of contextual learning technology:

- the technology of the problem-based approach to the organization of training, which involves the presentation of elements of the content of education in the form of multi-level personally oriented tasks. Therefore, in classes, great attention should be paid to solving socio-pedagogical situations and tasks, for which students had to offer their options for exits and solutions;

- the technology of educational dialogue, which is related to the creation of a didactic-communicative environment that provides subject-meaning communication, reflection, self-realization of the individual. For this purpose, listeners are invited to offer their options for life situations for their further discussion, playing and solving;

- technology of imitation and role modeling, which ensures the reproduction of conditions of competition, conflict; allows you to indirectly convey the appropriate system of values to students and put them in situations where different professional roles can be played.

Therefore, the course on innovative development of the education system should stimulate the creativity and creativity of the participants of the educational process, promote constructive changes in the "teacher-student" system.

Education should constantly develop the mechanisms of innovative activity, find creative ways to solve vital problems, promote the transformation of creativity into a norm and form of professional training of a specialist. Based on the main ideas of modern humanitarian knowledge about the understanding of education as a process of development of a person's personal resource, as a way of existence, self-change and self-determination of a person, the idea of individualizing the process of professional training in higher education institutions by means of innovative educational technologies involves orientation to the educational needs, achievements and personal and professional aspirations of everyone student; focus on solving current professional and educational problems; an active position in solving these problems; pedagogically appropriate help in professional education and positive change of the inner world for the purpose of self-realization in professional activity and life in general.

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1.4. ONLINE-STRATEGIES AND TOOLS FOR REMOTE TEACHING AND LEARNING IN HIGHER EDUCATIONAL INSTITUTIONS

Present day situations in the global world, in general, and the educational system, in particular greatly challenge both teachers and educators. The framework and reality of hybrid teaching and distance learning demand of a teacher to be in constant search of innovative technologies and interactive strategies. The balance between offline and online teaching and learning is not always easy to define, as well as to provide the most appropriate strategies and tools for effective remote teaching and learning. How to use technology with all this uncertainty is a big problem for teachers and students. Both native and foreign educational experience of the recent years has contributed greatly to the solution of this problem (Майєр, Устименко, 2018; Устименко, 2017; Boss, Larmer, 2018; Crawford, 2020).

Higher educational institutions in Ukraine have already created successful distance courses on major university subjects and disciplines on all educational programs. They function efficiently through applying such platforms as ZOOM, MOODLE, Google Meet, Microsoft Teams.

In this article we try to provide a descriptive analysis of the most popular platforms and tools for online teaching and learning. We will also present some illustrations of possible online strategies and engaging activities in the ESL Classroom, as well as their advantages and benefits in the current educational process.

Most of the teachers and researchers agree that Google Classroom makes it very easy for all teachers to provide a hybrid learning classroom. Designed from the ground up with teacher feedback, the platform allows teachers to communicate with students, share innovative and technologically productive tools, and create projects and educational elements in their everyday lessons. Google Classroom streamlines the process of having students on the same page, connecting with others and exchanging ideas through collaborative projects. Teachers can track the progress of each student, and after graduation teachers can return to work with feedback (Crawford, 2020).

ZOOM is software available on multiple platforms such as Windows, Android, Mac, and iOS devices. It is widely used by teachers in the current educational process and is one of the primary platforms for online education.

One of the beneficial features of ZOOM is whiteboard that allows the professors to draw or write something on the screen, shared with attendees or students to be precise. The whiteboard acts like a literal whiteboard that is used by teachers in class during teaching. Another feature that led to the boom of ZOOM usage was the ability to share the lecture screen. This feature allows the host or teacher to share their computer screen with students, just like in-class lectures. You can share the Power Point slides and other notes on the screen and simultaneously allowing the host or teacher to monitor the video feed of students if they are paying attention or not. Another feature that is convenient for both teachers and students alike is of “raise hand”. This allows the students to raise their hands, and this will prompt the professor that the student has some questions, rather than disrupt the flow of the lecture by abruptly asking a question.

Assignments are a major part of the learning curve, and ZOOM ensures students can easily submit their assignments through the file-sharing feature of ZOOM rather than the hassle of submitting them through a separate E-Mail. This also allows the students to carry on with their presentation on ZOOM. The teacher can even divide the ongoing class into small groups for students to hold

discussions. This allows the students to work in groups rather than tackling any problem individually (Crawford, 2020).

When a teacher uses ZOOM or Google Meet platforms for distance teaching and learning, he (she) should observe certain rules while delivering a lesson:

- 1) Work with ZOOM in maximized mode, not full screen.
- 2) Make sure you understand how to jump out of the ZOOM to do something else.
- 3) Make sure you are messaging the right person.
- 4) Get your students to update their names.
- 5) Share computer sound when you share screen.
- 6) Understand how ZOOM screen shares (all the current applications).
- 7) Be careful when you move from one application to another when screen sharing.
- 8) Be careful to prepare things in advance (video tapes).
- 9) Be careful when sharing links in the chat window.
- 10) Learn to create breakout rooms.

Google Meet platform also provides excellent options for both teachers and learners, such as chat column, record meeting, group projects, team rooms, questionnairing, videoconferencing, etc., that creates a wonderful way to cooperate and communicate.

Most of the current innovative technologies and interactive online tools can be applied both for synchronous or asynchronous learning (Darby, Lang, 2019; Darrow; Dixon, Shewell, Crandell, 2020). These interactive online tools can be used with the following purposes:

- 1) formative assessment;
- 2) tools for students and teachers to monitor their understanding;
- 3) engage students to actively participate;
- 4) opportunity for students to collaborate and communicate with each other;
- 5) to facilitate a feeling of being in the classroom;
- 6) opportunity for getting rapidly useful information.

There are a lot of interactive online tools at the disposal of a teacher for remote teaching that can be combined for various activities and used throughout lectures and practical classes (Dixon, Shewell, Crandell, 2020; Tsateri, 2020). Let us present their brief characteristics:

1. *Google Jamboard* – online digital whiteboard where students can interact with each other’s work in real time.

2. *Padlet* – online bulletin board program where students can post virtually any kind of media and respond to each other in real time, to share work they’ve done.

3. *Pear Deck* – Google Slides and powerful add-on that allows you to add open ended questions, quiz questions, drawings, draggables, etc.

4. *Nearpod* – student engagement platform with premade lessons, content-, interactive tools integrations with other ed tech programs.

5. *Kahoot!* – a very popular quiz game that can be used for review or checks for understanding (formative assessment).

6. *Flipgrid* (really great for remote teaching) – interactive platform where students post video responses and can respond to each other via video.

7. *Edpuzzle* – free platform where teachers can create customized interactive video content for students; allows to upload video from Youtube.

Further on we present a detailed description of the Kahoot! platform application in the ESL classroom.

Kahoot! is known as a free online platform for remote teaching and learning, in particular for creating and running learning games. It can be used to create multiple choice questions with embedded

pictures and videos. Teachers can either create their own Kahoots or search for publicly available games. There are hundreds of Kahoots out based on specific textbooks such as New English File or specific grammar points (Speroff, 2016). Kahoot! is popular in all learning environments and subjects.

There are a lot of ways of using Kahoot! in the ESL classroom. One can revise grammar, vocabulary, functional language, trivia or even phonology using Kahoot!. It is true that multiple-choice format somewhat limits your options, but you can get creative and use it to your advantage.

Here are some useful things and activities you can do using Kahoot! (MCQ format) (Speroff, 2016):

- You can make true / false or yes / no questions.
- You can ask which sentence is grammatically correct / incorrect.
- You can have the students choose an odd word or sentence out.
- You can ask questions about synonyms, opposites, homonyms.
- You can include more than one correct answer to make the task harder.

A language teacher can create vocabulary, grammar, functional language, reading and even listening quizzes.

An important consideration is the impact of technical issues on the validity and reliability of the quizzes or tests-a momentary lapse in connection might mean that a student loses connection to the game and thus loses points. Consequently, Kahoot! might be better used for informal or semi-formal assessment rather than for a high stakes end-of-the-course test (summative assessment).

Kahoot! lets a teacher download a copy of the game (test) score in Excel format where a teacher will see a total score for each participant which includes several correct / incorrect answers, as well as breakdown for each question, which is great for both assessment purposes, as well as for analyzing areas of strength and weakness for each student.

An ESL teacher can use Kahoot! as an alternative to textbook reading / listening activities (Speroff, 2016):

- Get students to read a portion of a text / listen to a part of a listening text, then ask a question in Kahoot. repeat until the students get to the end of the text. Ask more questions, perhaps requiring the students to re-read the text.

- Don't stop to show the correct answer to make sure you are teaching your students reading / listening skills rather than just testing them.

- Get the students to support the correct answer with a passage from the text. Ask the students why incorrect answers are incorrect.

- If the majority of the class didn't get the right answer, go over the text again. Demonstrate your reasoning-think aloud as you go over the answers, discarding incorrect ones and choosing the right ones.

- You can create your own questions or use the ones in the textbooks.

TRIVIA QUIZZES.

They can be both interesting and informative for students. This can be a fun way to test your students on non-language related materials. A teacher can use a Kahoot! quiz to familiarize the students with their textbooks and other materials:

- Distribute / make sure students have the textbooks (coursebooks).
- Make a quiz about the textbook features you think students should be aware of.
- Set a longer time limit for each question to give students enough time to find the answers.

Alternatively, trivia can be related to the institution where a teacher works and his (her) students' study. You can have the students read a brochure or website of your university, and then do a quiz on the university's facilities, rules, educational programs, students' exchange programs etc. (Speroff, 2016).

It is essential that an ESL teacher can use Kahoot! to teach new language material and develop speech habits and skills. Also known as Blind Kahoot, teaching with Kahoot! involves asking a "blind" question, i.e. the question the students don't know the answer to, followed by the explanation, an opportunity to answer the same question, and a reinforcing question allowing students to apply the knowledge.

The recently introduced Ghost Mode allows students to compete against their "ghost" selves. Once you finish a game (a quiz) of Kahoot!, you can choose to relaunch the same game in the Ghost Mode, which means that the students will be joined by their ghosts who will be repeating the exact performance of the last game – that is the "ghost" will "choose" the same answers with the same speed. The students will need to beat their previous score to get ahead.

Thus, Kahoot! is a great platform for both remote teaching and learning English as a foreign language. However, using Kahoot! requires some equipment, namely a large screen, a projector or a smartboard, smartphones or computers for students and a reliable Internet connection. The Kahoot! Academy Journal provides a lot of useful information for teachers, ESL teachers in particular.

Every teacher (English language teacher as well) knows and relies on a variety of approaches, methods and techniques for teaching whole-class, small-group and individual lessons when you are face to face with students in the classroom. But it is essential to know how to adapt these methods for online teaching with ideas to make conferences, mini lessons, guided reading, listening, speaking or writing activities when you are screen to screen. With an awareness of different instruction strategies, you will see how to make teaching, learning and feedback clear, efficient, and explicit, how to monitor and assess your students' progress, their speech habits and skills, and how to keep and sustain meaningful connections with your students. Every teacher (ESL teacher, in particular) has to decide which strategies are the most appropriate for him (her) and are most likely to engage the students; planning for multiple pathways is crucial.

What you choose to reach and teach with students of one particular group, may not be what is successful with others. Also, a teacher should keep in mind the following: there is no need to implement all this tomorrow. Look through and find something that feels adequate and accessible to you right now, or a certain idea that feels exciting and interesting, and give it try.

A teacher should set small, manageable goals, possible to achieve in the online classroom. The emphasis is on the art and craft of one's own teaching, as technology is just a tool. When choosing the technology tools, a teacher should rely on most, learn the type of device his (her) students will use and any limitations the technology may have on this particular device (Dixon, Shewell, Crandell, 2020).

In the ESL classroom lesson strategies are much various: they are a great choice in any grade level (beginner, pre-intermediate, intermediate, upper-intermediate, advanced levels) and can be used to teach strategies to support just about any skill or goal in any subject area just like one-on-one conferences. In a strategy lesson students are grouped because they would benefit from instruction and guided practice around the same strategy. When setting up small-group lessons, a teacher can either form the groups based on his (her) own assessments, and set a schedule, or he (she) can invite students to sign up for the topics that most interest them or are aligned to their goals. This way fully coincides with a student-centered approach which is highly emphasized in the current educational process.

During an English lesson, a predictable structure may help a teacher to keep his (her) lesson focused, impactful and engaging (Dixon, Shewell, Crandell, 2020; Levy, 2020):

1. Connect. Spend a couple of minutes connecting with your students on a personal level. Let them do most of the talking and practice empathic listening.

2. Teach. Remind students of their goal, what the topic is that they signed up for, and why you've convened them. Be clear about the strategy you'll offer and make sure it's not a book or writing piece specific.

3. Coach. Give students a chance to practice while you offer prompts, clues, support and feedback. The best way to do this is to put each student in their own breakout rooms. A teacher can move from room to room and have conversations without distracting other students. Another option is to have students turn down the sound while they are working, then turn their volume up to participate in coaching. This method can be more distracting than breakout groups, but it does have benefits: a teacher can easily keep an eye on the other students, and sometimes overhearing a peer's feedback is helpful.

4. Link. After the coaching period, pull the students back together, repeat the strategy clearly, and set the expectation for what students will do on their own after the meeting. It is relevant to add a visual for the strategy to a note-taking app or ask students to jot down the strategy in their own words and have them show their notes to the teacher.

Some useful tips for the teacher:

Breakout rooms: Set them up ahead of time and remind students how the session will go. When you are with them in the room, you will coach them; when they are working independently, they are working by themselves.

Note-taking: Take notes in between coaching individual students or when the small group has ended and you are getting ready for your next one.

When you are just starting with synchronous differentiated teaching in the online environment, it may be easier to schedule individual conferences rather than groups. As soon as you better know and understand students' needs, grouping them becomes easier.

Here are some illustrations of the experience of using online tools in the ESL classroom with philology students in Donbas State Pedagogical University:

**Iryna
Korotiaieva
Sloviansk
DSPU**

**Subject: Practical Course of English
(oral and written communication)**

Target group: Undergraduate students, Year 4, Philology Faculty
Level: B2+

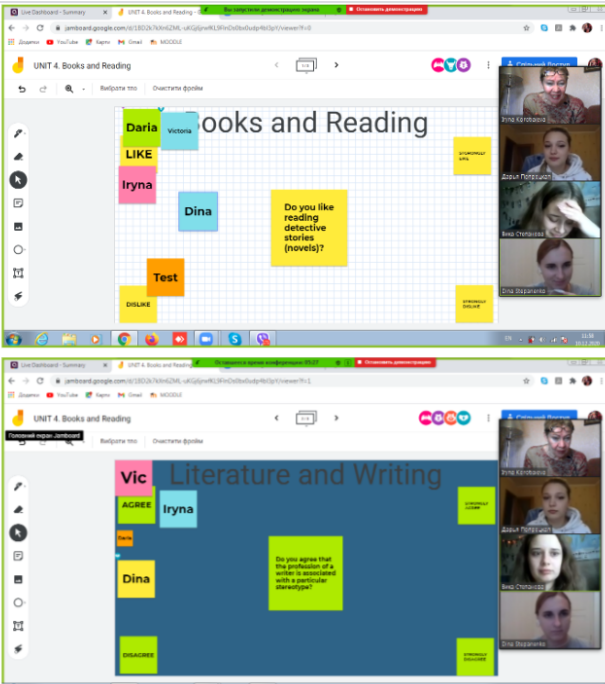
Module/Topic: Writing and Literature. Books and Reading
Tool used: Jamboard - Four corners with four different opinions

Mode: discussion and sharing the results by putting the named stickers on the opinions (answers)

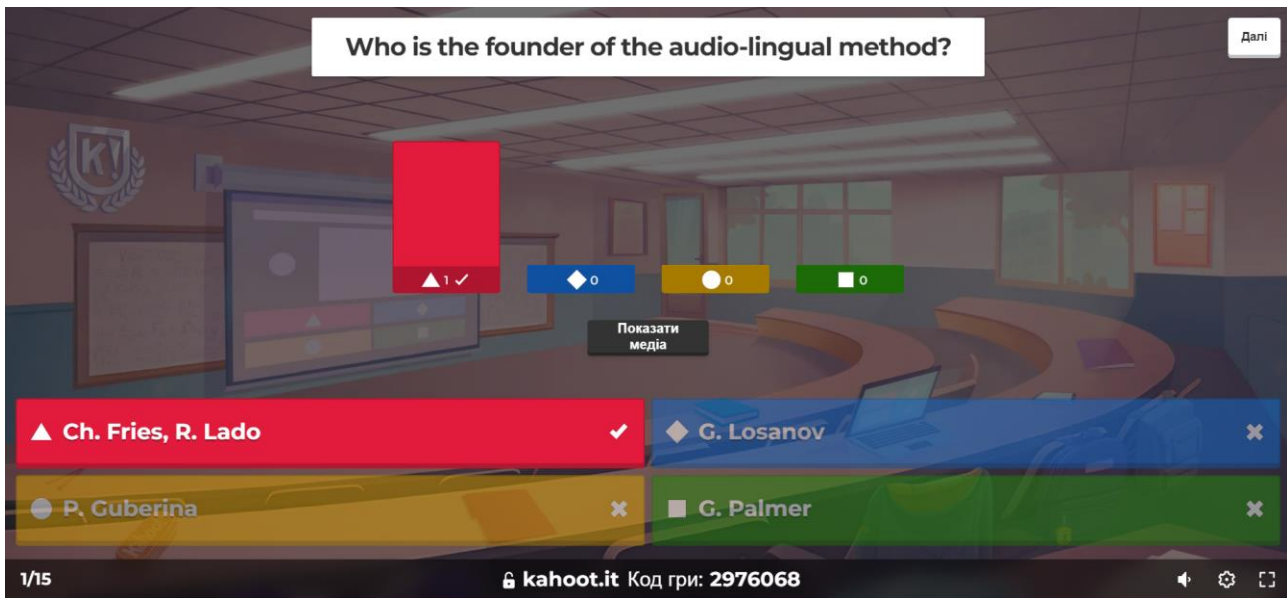
Qualities of a stereotypical writer. Chalk talk discussion - used as a pre-reading task.

Post-reading: students come back after reading the text and make some changes, referring to the information obtained from the text and present their ideas sharing the information obtained.

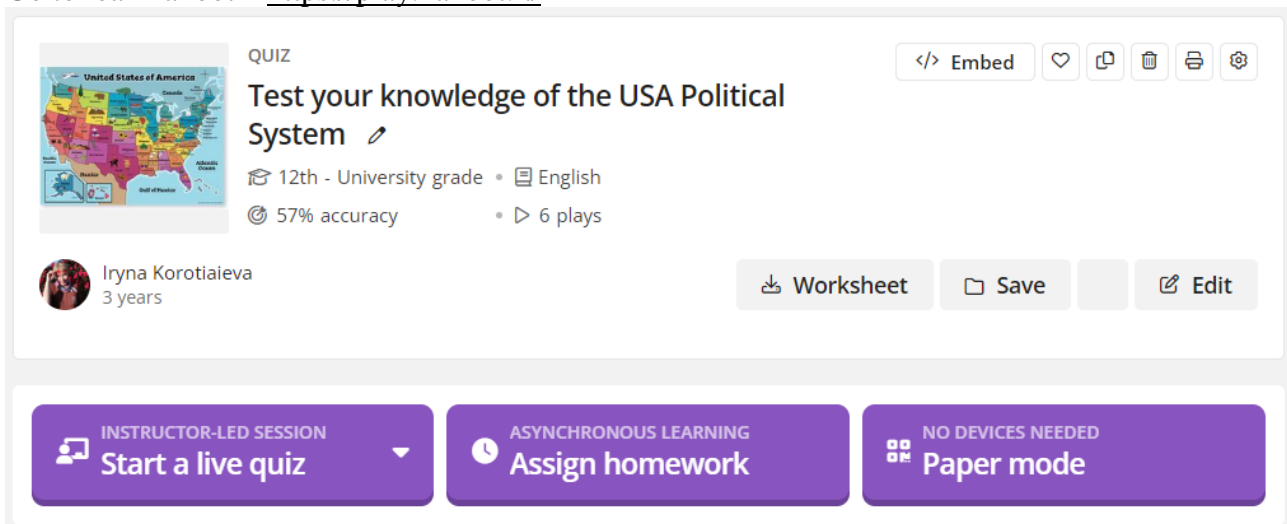
Feedback: very exciting, unusual and useful for future teaching practice



Go to real Example Jamboard – <https://bit.ly/3yZbdFy>



Go to real Kahoot – <https://play.kahoot.it/>



Go to real QUIZZZ – <https://bit.ly/2X9gtJt>

Conclusions.

It is not rare for teachers entering the world of classroom technology to be overwhelmed by the additional devices, applications and classroom management strategies needed for students to learn successfully in the context of remote teaching and learning. In these circumstances it is relevant for a teacher to have a proper methodological and digital competence. Modern technologies and tools allow teachers to concentrate on teaching so that students will focus on learning and their individual progress.

The guidelines provided in this article are aimed to facilitate the teachers by assisting them how to build strategies for distance teaching and learning and effectively use up-to-date tools for online education (in the ESL classroom in particular); to support teachers in their search of the most appropriate methods and techniques on how to apply different platforms, tools and educational apps.

Some methodological recommendations are suggested as for how to deal with troubleshooting and common problems while using up-to-date online tools, as well as tips and tricks for students and teachers how to make online tools and applications easier to use.

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