THE IMPACT OF DIGITALIZATION AND QUARANTINE RESTRICTIONS (COVID-2019) ON ENSURING THE QUALITY OF EDUCATIONAL SERVICES

Sahaidak Mykhailo
Simshah Iryna

Usage of information technologies, tools and software products has become an integral part of modern life. Digitalization has entered all spheres of society, especially during the introduction of quarantine measures caused by the COVID-19 pandemic. Currently, the most urgent issue for all countries of the world is capacity-building for transformation of the opportunities of higher education for training of people, students and supporting teachers, their adaptation, creative and effective work in a digitalized environment. At the same time, the main focus remains to ensure the quality of education, training and teaching. After all, it is quality that plays an important role in the development of high-quality education, further career growth of specialists and the development of the state.

The combination of educational processes and technologies is manifested in fast-growing online offers from universities around the world: the creation and development of platforms for mass online courses (from micro-credit programs to full-fledged step-by-step training programs); the introduction of course management systems, virtual reality elements into the educational process; the establishment of internal and external communication through the use of electronic document management and programs for electronic success accounting; the creation and functioning of virtual universities, etc. Back in 2014, Google published the most searched for queries in the "Universities" category. According to Google, most of the queries were related to online learning. Among the most popular universities, according to published data, were the University of Phoenix (USA), Massachusetts Institute of Technology (USA) and Open University (UK). The ranking of the most popular platforms for mass online courses, through which the world's leading educational institutions offer their services, is headed by Coursera,

which has more than 2000 programs ranging from coding to personal development. The Ukrainian equivalent is the Prometheus platform for open mass online courses.

The period of both strict and adaptive quarantine restrictions caused by the COVID-19 pandemic forced educational institutions to review their technical and technological equipment, taking into account the implementation of remote and mixed forms of training, and retrain scientific and pedagogical personnel. The emphasis was placed on rapid response and search for solutions in quarantine conditions. Most educational institutions have organized 100% filling of educational content in their existing course management systems in a short time (a common global practice is to use Modular Object-Oriented Dynamic Learning Environment (MOODLE)) and switched to using software products for organizing remote conference communication using cloud technologies for effective training sessions. However, in the process of establishing remote communication, the following factors remained unaccounted for: technological equipment and digital skills of teachers, access to the Internet network and the technical ability of applicants to take advantage of the opportunities provided. One of the most common problems faced by both applicants and teachers is low speed or lack of an internet connection. According to the data provided by PJSC "Ukrtelecom", at the end of 2019, 15% of the total population of Ukraine is in the digital divide zone, that is, they are not covered by the network of any of the internet service operators[249].

Based on the results of international studies conducted by Cable.co.uk and M-Lab, in 2020, Ukraine ranks 92nd in the world, out of 221 countries in terms of broadband speed[250].

A visual representation of the results of research published by Interactive map, which shows the name of the corresponding country, its rating among 221 countries, the average download speed

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[249] Укртелеком «15% населення України живе в зоні цифрового розриву», 2019. URL: https://ukrtelecom.ua/presscenter/15-naselennya-ukraini-zhive-v-zoni-tsifrovogo-rozrivu/

[250] Worldwide broadband speed league, 2020. URL: https://www.cable.co.uk/broadband/speed/worldwide-speed-league/

and how long it takes to download a 5 GB HD movie at this average speed, is shown in Fig.1, and dynamics of changes in the average download speed in Ukraine in 2017-2020, shown in Fig.2.

Figure 1. Interactive map of countries by average broadband speed measured

Source: Worldwide broadband speed league, 2020 (https://www.cable.co.uk/broadband/speed/worldwide-speed-league/)

Color-coding of countries allow you to see the regions with the fastest and slowest broadband speeds. Majority of the"fast" countries are located in Europe, while the slowest are located in the area of the African continent.

It should also be noted that in 2019, Ukraine ranked 81st out of the 207 countries studied. On Fig.2 you can see the dynamics of changes in the average download speed over the past 4 years. In general, there is a growth trend in the average download speed.

As digital disruptions increase during the COVID-19 pandemic, which is caused by an increase in the number of users and internet operations, the problem arises of how best to combine technological capabilities and human well-being. This issue is at the top of the agenda of world leaders. The Network Readiness Index (NRI) shows the application and use of information and

communication technologies (Network Readiness Index 2019: Towards a Future-ready Society, 2019). NRI serves as a tool for assessing progress and sustainability in the digital age, including their impact on the development of the digital economy.

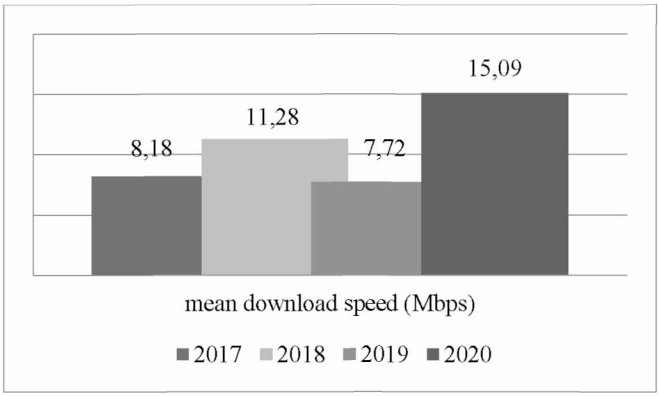

Figure 2. Dynamics of changes in the average download speed in Ukraine (2017-2020)

Source: Formed by author(s)

Thus, in 2019, compared to previous years (2016, 2015), an improved NRI was introduced. This was done to recognize the idea that a collective, prosperous future can only be achieved by integrating people and technology with the right governance structures. The improved NRI is based on four main dimensions (Fig.3): technology, people, management and influence. Participating countries are ranked based on their results in 62 variables[251].

As noted in the Network Readiness Index 2019: Towards a Future-ready Society, "technology" is the foundation of the network economy. In this category, the level of technology is evaluated by such blocks as: "Access" (the basic level of ICT, which includes communication infrastructure and accessibility); "Content" (digital

[251] Worldwide broadband speed league, 2020. URL: https://networkreadinessindex.org/

technologies that are produced in countries and local content) and "Future Technologies" (he degree of countries' readiness for the future of the networked economy and the introduction of artificial intelligence and Internet of things technologies).

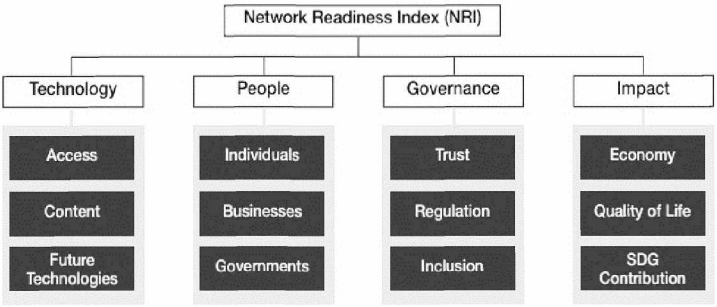

Figure 3. The Network Readiness Index (NRI) 2019 model

Source: The Network Readiness Index 2019: Towards a Future-Ready Society (https://cutt.ly/xgqHfl9)

The next category, "People", characterizes the use of ICT based on the analysis: "Individuals" (people's use of technology and skills), "Businesses" (use of ICT by companies) and "governments" (use and investment of ICT by government). The components of this category are: "Trust" (safety of people and companies in the context of the networked economy); "Regulation" (the degree to which the government is encouraged to participate in the networked economy through regulation) and "Inclusion" (digital differences between countries)[252].

"Impact" assesses the consequences of participation in the networked economy in the categories: "Economy" (economic impact), "Quality of life" (social impact) and "SDG Contribution" (the role of ICT in the context of the Sustainable Development Goals).

[252] Network Readiness Index 2019: Towards a Future-ready Society, 2019. URL: https://networkreadinessindex.org/2019/nri-2019-analysis/

According to the data obtained, the highest positions by the NRI indicator are occupied by Sweden, Singapore, The Netherlands, Norway and Switzerland (Network Readiness Index 2019: Towards a Future-ready Society, 2019). According to this indicator, in 2019, Ukraine ranked 67th out of 121 countries studied.

In general, as can be seen from Fig.4, the main driving force is "people". While the greatest scope for improvement is technology.

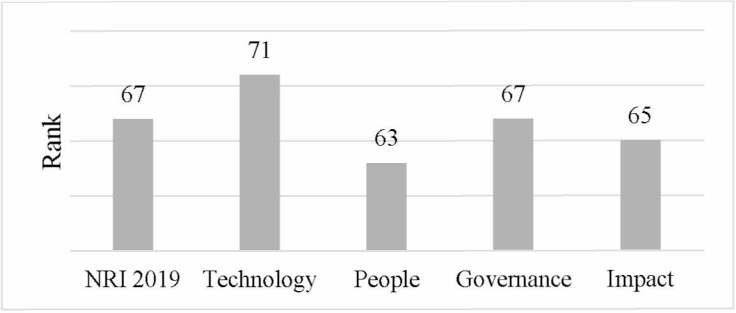

Figure 4. Ukraine global ranking, overall and by pillar

Source: The Network Readiness Index 2019 Ukraine (https://networkreadinessindex.org/countries/ukraine/)

As you can see in Fig.5 Ukraine is part of the group of countries in the European region with a lower-than-average income level. As noted in the report "Network Readiness Index 2019 Ukraine", Ukraine's strong indicators include adult literacy, e-commerce legislation, and income inequality (Fig.5). In contrast, the weakest indicators are the economy, including 4G mobile network coverage, phone prices, and the freedom to make life choices.

Thus, we can see that the level of "digitalization" of Ukraine and the level of its readiness requires considerable attention and development.

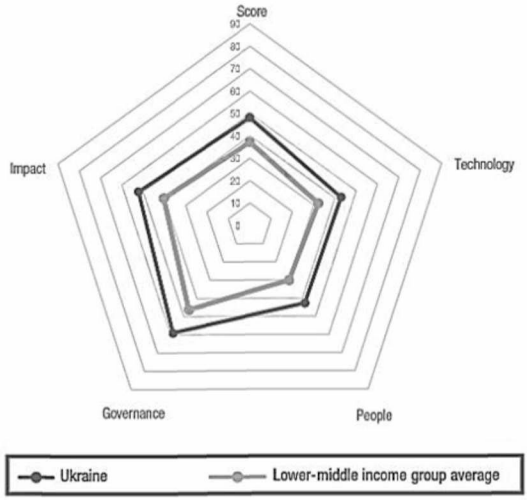

Figure 5. Performance Overview (Ukraine, 2019)
Source: The Network Readiness Index 2019 Ukraine (https://networkreadinessindex.org/countries/ukraine/)

The rapid, and sometimes drastic, transformation of methods and forms of work caused by the development of technology since the announcement of the Fourth Industrial Revolution at the Davos forum in 2016, has led to significant changes in the qualification requirements of relevant personnel. Data from the World Economic Forum in Davos shows that about 133 million new jobs are projected to be created by 2022 (Fig. 6)[253]

Digitalization of work processes, the widespread introduction of elements of artificial intelligence and other technological developments is gaining momentum. Along with this, the shortage of personnel for such processes is also increasing. Thus, it is necessary to review the professional profile of specialists with

[253] Jobs of Tomorrow: Mapping Opportunity in the New Economy, 2020. URL: https://www.weforum.org/reports/jobs-of-tomorrow-mapping-opportunity-in-the-new-economy/?trk=elevate_tw

the appropriate skills who will be able to occupy the appropriate jobs and perform the assigned tasks.

Table 1 - Top-ranked and bottom-ranked indicators of Ukraine

Strongest indicators	Rank	Weakest indicators	Rank
Adult literacy rate	1	Government online services	90
E-commerce legislation	1	Use of virtual social networks	92
Income inequality	1	Legal framework's adaptability to digital business models	93
Use of clean fuels and technology	1	Active mobile-broadband subscriptions	97
Tertiary enrolment	14	Availability of latest technologies	99
Fixed-broadband subscriptions	16	Happiness	100
Computer software spending	19	Rule of law	102
Professionals	29	Freedom to make life choices	105
Online trust and safety	32	Handset prices	107
Internet access in schools	40	4G mobile network coverage	119

Source: The Network Readiness Index 2019 Ukraine (https://networkreadinessindex.org/countries/ukraine/)

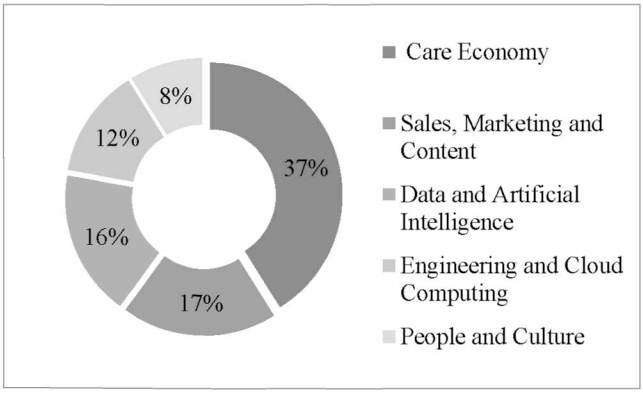

Figure 6. Areas of emergence of new professions according to the World Economic Forum in Davos

Source: Formed by author(s)

At the same time, the training of such specialists reaches a qualitatively new level, when the possession of certain highly specialized knowledge is combined with excellent communication skills, creative thinking and the ability to learn throughout life. So, the key to career growth is not only a person's understanding of the combination of skills that are most in demand and appreciated by companies, but also an understanding that the continuous transformation of modern information technologies leads to rapid changes in the most popular Top skills of the XXI century.

As noted by Bruce Anderson 2020 in the modern world, soft and hard skills are changing. Soft skills mainly focus on behavior and thinking, personal traits, and cognitive skills that can help a professional develop in a variety of roles and fields. Thus, if hard skills are understood as certain knowledge and abilities to perform a specific task, then the development of soft skills allows you to understand how to perform this task in the context of communication, coordination, cooperation and, as a result, making the necessary decisions.

In the context of changes that have occurred under the influence of quarantine restrictions caused by COVID-19, skills that include knowledge of software and technical abilities are increasingly in demand in the labor market. Their use, combined with the ability to organize a team in a remote work environment, is the key to maintain the company's competitive position.

Based on the results of research conducted by Burning Glass Technologies, a set of new skills that meet the requirements of the digital economy was identified (The new Foundational Skills of the Digital Economy, 2020). The study examined skills in the labor market based on a set of more than 150 million unique advertisements in the United States. 14 skills were identified as the main ones in the new economy and can be grouped into three groups: Human skills, Digital building blocks, and Business enablers (Fig.7).

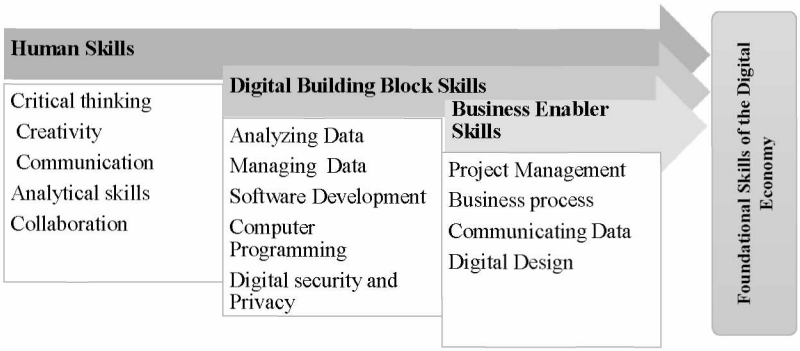

Figure 7. The New Foundational Skills of the Digital Economy
Source: Formed by author(s)

The first group include "soft skills" (critical thinking, creativity, communication, analytical skills, collaboration, and relationship building). The second group of skills is needed by analysts and data-driven decision makers. This group includes data analysis, data management, software development, computer programming, digital security and privacy. The skills of the third group are used in practical situations (project management, business processes, data transfer, digital design)[254].

If we conduct a comparative analysis of the top-10 most popular hard skills worldwide and the top-5 most popular soft skills according to LinkedIn data for 2019 and for 2020 (Fig.8), we can see how the development of technologies affects the requirements for specialists.

From Fig.8 it is also clear that the list of the most popular soft skills is consistently headed by creativity. However, lets also note changes in the fifth position - emotional intelligence, a skill that is becoming more and more popular both in the professional sphere and in everyday life. As you can see, in 2019 According to LinkedIn, Cloud Computing, Artificial Intelligence, and Analytical Reasoning were among the most popular hard skills. While for 2020, the list

[254] The New Foundational Skills of the Digital Economy, 2020. URL: https://www.burning-glass.com/research-project/new-foundational-skills/

was headed by a skill that was not even considered before - blockchain.

Figure 8. The Most In-Demand Hard and Soft Skills of 2019 and 2020

Source: Formed by author(s)

In times of rapid changes, it is becoming increasingly difficult for specialists to maintain their competitive advantages without constant self-development and professional development. Thus, modern workers should be included in the lifelong learning process.

At this stage, the educational content offered by higher education institutions becomes important. The relevance of educational programs, their connection with the labor market and real business requirements become the key to successful professional realization of their graduates. To do this, educational institutions

need to implement a quality assurance policy in accordance with Standards and guidelines for quality assurance in the European Higher Education Area (ESG), form an internal quality culture and build communication channels with all their stakeholders, both internal and external. ESG contains a generalized set of standards and recommendations for internal and external quality assurance systems of Higher Education, a kind of reference point for both higher education institutions (in the context of the quality of training and educational services), and for institutions involved in the development and implementation of education quality assurance policies in general[255].

It should also be noted that Paris Communiqué, signed as a result of the conference of Ministers of education of the countries participating in the European Higher Education Area (Paris Communiqué, 2018), notes the need for cooperation for search and application of innovative teaching and teaching practices for the further development and implementation of student-oriented learning and the principles of open education in the context of lifelong learning. The communique also notes the importance of creation and development of curricula to ensure a variety of methods and flexible forms of learning that will further promote both social mobility and continuous professional development[256].

In the context of updating of educational programs, it is necessary to establish relations between the educational institution that offers educational services and business structures that are potential employers for graduates of these institutions. This process should be based primarily on mutually beneficial terms. Managers of both large and small companies are interested in obtaining specialists who, after completing the relevant training program, are ready to perform the tasks set, make decisions within their authority and be responsible for the relevant decisions. For successful professional

[255] Standards and guidelines for quality assurance in the European Higher Education Area, 2015. URL: https://enqa.eu/index.php/home/esg/

[256] Paris Communiqué, 2018. URL: http://ehea.info/page-ministerial-conference-paris-2018

growth, specialists are expected to show creativity and leadership qualities. In the context of a pandemic, professional and emotional stability skills are also becoming popular.

Today, majority of business structures have their own training programs for specialists, which are aimed not only at professional training, but also at retraining graduates of higher educational institutions who do not have the necessary set of skills. At the same time, they show readiness to be included in the educational process even at the stage of formation of a future specialist in order to improve training programs, include the necessary professional competencies, as well as practical skills, taking into account current trends and requirements. However, the effectiveness of such a process will depend on the willingness of all parties to cooperate, the presence of common interests and the desire to find compromises in solving the issues raised. Equally important are the development of mechanisms for effective cooperation based on compliance with the sequence of actions, commitment, implementation of selected obligations and self-discipline. Thus, interaction between educational institutions and businesses should be based on the principles of strategic partnership.

It should be noted that the state also plays a significant role in the process of establishing such interaction. Namely, the existence of a clear state policy and its unconditional compliance at all levels of implementation of the educational process. Today, a significant number of domestic and foreign publications are devoted to the issue of interaction in the system of relations "Education-Business-State", because the economic development of the state depends, among other things, on the activities of enterprises, organizations, institutions and companies. The success of the latter depends on many factors, which are based on a professional who is able to produce ideas, develop implementation mechanisms and implement them. And it is universities that are the intellectual and professional center that is able to create an appropriate atmosphere and offer new non-standard solutions and projects that can be implemented on the basis of a partner company.

In recent years, the involvement of employers in the implementation of the educational process has been rapidly gaining momentum, in particular, due to the state policy in the field of higher education and certain criteria for ensuring the quality of Higher Education. More and more enterprises in the country are entering into an open dialogue with universities to jointly find ways to improve existing educational training programs, adapt them to the real requirements of the labor market and adjust their content to develop the necessary competencies. To achieve this goal, events of various scales are held annually: All-Ukrainian business forums and conferences, local meetings within the framework of seminars, round tables, etc.on the basis of relevant higher educational institutions, visits to enterprises together with students, etc. The results of such meetings, as a rule, are the achievement of certain agreements (signing of the contracts, memorandum of cooperation, etc.), which are further implemented through cooperation in organization of practical training for students and improvement of the skills of teachers. Today, there is an increasing demand for such types of employers attraction, namely: holding competitions for business ideas, startups, where talented students can receive funding for the implementation of the presented projects; organization of open lectures to discuss modern topics and solve specific real cases. This format allows you to develop the creative potential of students, encourage them to engage in cognitive and research activities with the support and advice of leading specialists in a particular field, and, as a result, commercialize the results obtained. However, it should be noted that the choice of a partner university as a platform for generating ideas and creating real projects, as well as the reverse process – involvement of business representatives in the educational process – should take place on the basis of in-depth analysis. Understanding the goals and priorities of each interested party is the basis for effective cooperation. To do this, at the stage of the "birth" of the idea of partnership, as noted by Lars Frelund, Max Riedel and Fiona Murray, business organizations need to assess the readiness of the parties for productive interaction. The authors have developed a

special form called "University partnership canvas", which contains 6 questions[257]:

1. What business goals define your partnership with the University?
2. What are the main activities of your partnership with the University and how do they ensure compliance with your business goals?
3. Who are your main partners and by what criteria were they selected?
4. What forms of cooperation correspond to your areas of activity and business goals?
5. What people, processes, and organizational structures support your partnership with the University?
6. What performance metrics are most useful for evaluation of your partnership?

The answer to these questions will allow you to determine the prospects for cooperation, set clear requirements for the qualification of graduates and attract talented specialists to implement your business strategy.

In this context, the international community, as noted in the Paris communique, is ready to provide full support to educational institutions to develop and improve their own programs and strategies for the development of learning and teaching (Paris Communiqué, 2018). At the same time, the involvement of students in the innovative activities of their educational institutions can be implemented by creating interdisciplinary educational programs or implementing a dual form of training, in which academic training is enhanced by real experience and training directly at the workplace. The latter, despite its long existence in the world's leading educational institutions, is only gaining momentum in Ukraine. Since 2019, 44 educational institutions of higher and vocational education have participated in a pilot project to train dual-form specialists in 53

[257] Lars Frølund, Fiona Murray, and Max Riedel Developing Successful Strategic Partnerships with Universities, 2017. URL: https://sloanreview.mit.edu /article/developing-successful-strategic-partnerships-with-universities

specialties with the involvement of leading IT companies, enterprises in the banking, design, food and agricultural sectors[258].

On the other hand, such institutions as Quality assurance agencies, whose creation and operation are also provided for by the ESG (Standards and guidelines for quality assurance in the European Higher Education Area, 2015), also act as partners in the quality assurance process. The activities of these agencies are designed to help higher education institutions assess the effectiveness of internal quality assurance systems, including the involvement of employers as partners in the educational process. To do this, educational institutions apply to the relevant agencies with a request to conduct an expert examination of a separate educational program, or activities in general, by involving independent experts. The latter get acquainted with the information provided by the institution in accordance with the established form, and make a visit directly to the institution of Higher Education. Upon completion of familiarization with the existing internal processes and procedures, the involvement of all interested parties, experts form clear recommendations for improvement, development and positioning of the relevant educational program in the market of educational services, as well as the Internal Quality Assurance System of the institution's activities in general.

In the face of uncertainty and constraints caused by the COVID-19 pandemic, the issue of quality of education and necessary procedures has become the number one issue of all quality assurance agencies around the world. Examples of the activities of quality assurance agencies and real-world cases of work adaptation to the current conditions are published by the European Network for Quality Assurance in higher education (External quality assurance in the time of COVID-19, Case examples from ENQA member agencies, 2020). Among them, as an example, the case of the National Agency for quality assurance of higher education of

[258] Міністерство освіти і науки України «У 44 закладах стартував пілотний проєкт із впровадження дуальної освіти – він триватиме до 2023 року», 2019. URL: https://mon.gov.ua/ua/news/u-44-zakladah-startuvav-pilotnij-proyekt-iz-vprovadzhennya-dualnoyi-osviti-vin-trivatime-do-2023-roku

Ukraine (NAQA), whose activities are aimed at formation of a culture of quality of education[259].

According to the specified information, with the introduction of quarantine restrictions in the country and the ban on holding public events, the agency's activities were switched to remote mode using information technologies (External quality assurance in the time of COVID-19, Case examples from ENQA member agencies, 2020). The NAQA also decided to develop a procedure for conducting virtual visits to institutions and ensuring that accreditation examinations are conducted via the Internet. For this purpose, a temporary procedure for conducting an accreditation examination using technical means of video communication was developed (A temporary procedure for conducting an accreditation examination using technical means of video communication, 2020), which was later given effect by a government decision. In accordance with a certain procedure, familiarization with the institution of Higher Education, meetings with its management and all groups of interested parties takes place online. To provide information support, NAQA has developed communication channels through its official website and social networks (Facebook)[260].

Thus, modern conditions require urgent actions and management decisions to adapt working and learning conditions, taking into account external factors, as well as digitalization of the educational process and the skills of all its participants. To ensure quality, higher education institutions must create conditions for the formation of specialists with a set of skills that are required in the modern digital economy. To do this, it is necessary to understand the importance of XXI century skills development by the teaching staff, and, as a result, to review the methods and forms of education. Also, close cooperation with business goals coordination and expectations

[259] Strategy of the national agency for higher education quality assurance to 2022, 2019. URL: https: https://en.naqa.gov.ua/wp-content/uploads/2020/04/Strategy-to-2020.pdf

[260] External quality assurance in the time of COVID-19 Case examples from ENQA member agencies, 2020. URL: https://enqa.eu/wp-content/uploads /2020/06/External-QA-in-times-of-COVID-19_case-examples.pdf

in the context of training, internships, and work skills development will ensure not only the coordination of educational content, but also the formation of talented young people capable of performing new jobs in the digital and network economy.

Sahaidak Mykhailo
DSS, Professor, Head of Management Department
SHEE "Kyiv National Economic University named after Vadym Hetman", Ukraine
https://orcid.org/0000-0001-6526-1170
mykhailo.sahaidak@kneu.ua

Simshah Iryna
Assistant of Management Department
SHEE "Kyiv National Economic University named after Vadym Hetman", Ukraine
iruna.simshah@kneu.ua