



DIGITAL COMPETENCE: ABILITIES OF A LECTURER AND EXPECTATIONS OF STUDENTS (UKRAINIAN-POLISH CONTEXT)

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Abstract: *The task of shaping the IT competence of a modern teacher, in particular academic teacher, is quite current and important. It is associated with the turbulent development of information and communication technologies, with the formation of an information society. The purpose of the article is to analyze the features and dynamics of the formation of digital competence of university lecturers in Ukraine and Poland, to identify and justify the direction of increasing the digital competence of lecturers of higher education. Has presented the positive experience of universities of Ukraine and the Republic of Poland in improving the level of digital competence of teachers, recommendations of research teams on improving the digital competence of lecturers and conclusions and prospects for further research*

Keywords: digital competence; competence development; teacher of higher school; advanced training; digital technologies.

INTRODUCTION

Modern strategies of developing higher school and improving its quality largely depend on the human resources of higher education institutions as well as the readiness of lecturers to change and introducing new educational trends into practice. Among these trends, the leading place is occupied by digital technologies.

Today their use in the educational process is not only a requirement but also the norm. In this context, the requirements to the activities of higher school lecturers are changing; irreversible are the transformations in the sphere of their professional competence, in particular the digital one. In 2018, it was the digital competence, comprising confident, critical and responsible use and interaction with digital technologies for education, work and life in society, which was defined as one of the key lifelong learning skills (according to the updated recommendations of the European Parliament and the Council of the EU (Council Recommendation, 2018).

At the same time, the analysis of experimental data on the development of competencies of lecturers of higher education shows the lack of formation of such a system-forming competence as the digital one (Khoruzhaya, Bratko, Kotenko, Melnychenko, Proshkin 2018). In modern social and cultural conditions, when the growth of a new generation takes place in a rich and dynamic information environment, lecturers in the information age need to achieve a new level of professional activities. As T. Noskova mentions, it is necessary to teach, develop, and educate young people not only by means of pedagogical communication but also by instrumental means of the electronic environment (Noskova, 2016).

Consequently, there is a need to study the real state of lecturer`s digital competence development, as well as the development of ways to improve their information literacy, showing opportunities for effective communication and cooperation, the creation of digital content, etc.

I. BACKGROUND RESEARCH

Activities of modern higher school lecturers take place in both global and local contexts. The world has become mobile, dynamic development, digital. Therefore, the methodology of the study was based on the analysis of the real state of digital competence development of lecturers as performers of an important social mission.

For the study, higher school lecturers from two countries – Ukraine and the Republic of Poland – were selected. These countries have shifted from post-socialist countries to the universally recognized European values, close to each other in their history and culture.

In Ukraine, the development of informatization of education takes place in accordance with national and European programs ("Digital agenda of Ukraine – 2020" (Digital agenda, 2016), containing priority areas, initiatives, projects of digitalization of Ukraine until 2020, the program "UNESCO ICT competency framework for teachers" (UNESCO ICT competency, 2011), "European Framework for the Digital Competence of Educators" (DigCompEdu 2017) etc.

Moreover, various aspects of informatization of higher education have been the subject of research of a number of scientists in Ukraine. For example, V. Bykov and M. Shyshkina found out, that the formation of the educational and scientific environment of higher education institutions using digital technologies gives the possibility to combine science and practice, integrate the process of training and carrying out scientific research, improve results and level of organization of academic teaching activities. It is the defining trend in the development of scientific and educational information networks and systems of open education and science (Bykov, Shyshkina 2016). O. Spivakovskiy analyzed the main ways of building ICT infrastructure of the University. He studied the impact of IT development of the University on its rating indicators, identified the main components of information and communication pedagogical environment of higher education institutions (Spivakovsky, Vinnyk, Tarasich 2014). N. Morze presented a model of the standard of ICT competence of teachers in the context of European quality standards in the University educational environment (Morze, Kocharyan 2014). L. Panchenko developed a theoretical and methodological basis for the development of information and educational environment of the University (Panchenko 2010). Y. Modlo, A. Striuk, S. Semerikov, outlined the features of using augmented reality technology in a mobile-oriented learning environment of higher educational institution (Modlo, Striuk, Semerikov 2017). O. Glazunova, O. Kuzminska and others carried

out a comparative analysis of using Microsoft and Google cloud services in the organization of group project work of University students (Glazunova, Kuzminska, Voloshyna, Saiapina, Korolchuk 2017).

The analysis and research on the functioning of universities in the conditions of global digitization and the development of virtual space were dealt with by: Galwas (2004, 2012), Kusiak, Tadeusiewicz (2004), Wieczorkowska, Madey (2007, 2010), Sysło (2002, 2004), Tadeusiewicz (2007, 2008), and among foreign scientists: Collins (2000), Noskova (2015), Siemens (2005) and others. Conceptual aspects of changes in education in the knowledge society and computerization of education were studied and contributed significantly: Kojs (2014), Kupisiewicz (1970, 1999, 2012), Lewowicki (1994, 2005, 2009), Nikitorowicz, Misiejuk (2009), Śliwerski (2011, 2014), Sysło (2002, 2015), Strykowski (2004), Wenta (1988, 2014b, 2014c). The preparation of contemporary specialists, including teachers in the field of ICT and e-learning, is provided by: Collis (1994), Bednarczyk, Woźniak (eds., 2007), Sysło (2002), Siemieniecki (2002), Wenta (2002). A significant contribution to research on the educational use of ICT in academic practice is provided by: Kozielska (2011), Sysło (2002), Tanaś (1997, 2005, 2007), Topol (1988, 2013), Walat (2004), among foreign scientists: Noskova (2015), Polat (2004, 2006), Salmon (2004), Savin-Baden (2000), e-learning: Clarke (2007), Siemens (2005), Smyrnova-Trybulska (2007, 2014, 2015), Sysło (2002, 2015) and others.

As has been emphasized earlier, the task of shaping the IT competence of a modern teacher, in particular academic teacher, is quite current and important. It is associated with the turbulent development of information and communication technologies, with the formation of an information society, that is, a society in which most professions are related to the search, storage, processing, presentation, transmission of various data.

In English-language literature, the term information literacy (IL) is used to describe the ability to effectively use information in the implementation of accepted tasks and goals. According to Christine Bruce, although the information literacy idea dates back to the seventies of the last century, it was only in the 21st century that it became a key competence. Although many organizations, researchers and scientists have attempted to describe information literacy, there is currently no universally agreed one common definition of the term. The definitions known from the literature most often define this concept as a set of skills related to acquiring information, ranging from the identification of information needs, to the effective use of information (Borawska-Kalbarczyk 2015: 131). The term was first used by the American educator Paul Zurkowski, the then president of the US Information Industry Association, in 1974 in the report *The Information Service Environment, Relationships and Priorities*. This concept became widespread in education in the eighties of the last century, when educational programs in this field began to be developed. Their results were models and standards of information competences disseminated by such organizations as: American Library Association, Association of College and Research Libraries, American Association of School Librarians, Chartered Institute of Library and Information Professionals, Society of College, National and University Libraries. (Smyrnova-Trybulska 2018: 148).

In her research, Torlińska analyzes and states examples of the definition of the term literacy (Torlińska, 2005: 369). Currently, one of the more frequently cited is the definition proposed by the American Library Association (ALA) in 1989: information literacy is a set of skills enabling the identification of information demand and its localization, evaluation and effective use. Efficiently using information is for those who have learned how to learn. They know how to learn because they know the organization of knowledge, they can find and use information so that others can use it. They are prepared for continuous self-education because they know how to find the information needed to solve a problem or make a decision (American Library Association, 1989). (Smyrnova-Trybulska, 2018: 148).

Despite the diverse research, the issues of increasing the level of Ukrainian and Polish lecturers' digital competence, as well as the use of digital technologies for their competence development require further solutions. The purpose of the article is to analyze the features and dynamics of the formation of digital competence of University lecturers in Ukraine and Poland, to identify and justify the direction of increasing the digital competence of lecturers of higher education.

2. RESEARCH METHODOLOGY

To achieve the goal of the study we used a set of appropriate methods: analysis of scientific literature to find out the state of development of the studied problem, the definition of categorical and conceptual apparatus of the study; synthesis, generalization, systematization for the theoretical justification of the use of digital technologies for the competence development of lecturers of higher education; empirical: diagnostic (conversation, content analysis, testing), statistical (Pearson's criterion) to track the dynamics of the level of formation of digital competence of lecturers of higher education.

The article presents some results of the study obtained in the framework of the international project #21720008 "Competencies of higher school lecturers in the epoch of changes", which was implemented during January – December 2018 with the assistance of the Visegrad Fund and the Ministry of Foreign Affairs of the Netherlands. Among the performers of the project were scientists of Borys Grinchenko Kyiv University (Ukraine) and the University of Silesia in Katowice (Poland).

3. RESEARCH RESULT

3.1. Some results of the international project "Competences of lecturers of higher school in the epoch of changes"

Today, the digital world has an autonomous life and its development cannot be stopped: the Internet of things, self-organization of the network, a variety of information resources and so on. Digital reality is already a sign of selection in society. All these challenges of the digital age affect the essence of the key competences of the teacher, in particular, the digital one, as well as his willingness to change and improve in these conditions. The international project "Competences of lecturers of higher school in the epoch of changes" aimed at diagnosing the competences of higher school teachers.

In total, 621 respondents from Ukraine and the Republic of Poland as the participating countries of the project took part in the study "Competences of lecturers of higher school in the epoch of changes": 188 teachers and 433 students (see table 1).

So we had the opportunity to carry out a comparative analysis of the development of key competences of higher school lecturers, as well as determine the prospects for their improvement. Among the various competences, a modern teacher should have, the digital one requires special attention. It works as a catalyst in the activities of the lecturer, developing other key and professional competences, as they enable setting and solving professional tasks, using the possibilities of the electronic environment.

Table 1.**Summary statistics by respondents**

Country	Lecturers	Students
Ukraine	125	269
Poland	63	164
Total	188	433

Source: Own work

In the proposed study digital competence includes the following structure: confident, critical and responsible use and interaction with digital technologies, work with information and use of ICT, which echoes the main provisions of the updated recommendations of the European Parliament and the EU Council for lifelong learning (Council Recommendation, 2018). Indeed, people need to understand how digital technologies can support communication, creativity, and innovation, and be aware of their capabilities, limitations, effects, and risks. It is also important to be able to use digital technologies for active citizenship, social integration, and cooperation, creativity according to personal, social or commercial goals. Digital skills also include the ability to use, access, filter, evaluate, create, program, and share digital content. Based on this, we present the criteria for the formation of digital competence of teachers: information and data literacy, digital communication and cooperation, the creation of digital content, responsible use of ICT, digital problem-solving.

Let us consider in detail how the participants of the study assessed the importance of digital competence in the professional activity of a higher school lecturer (see Table 2).

For the assessment of digital competence the respondents were expressing opinion on following issues:

- introduction of innovative learning technologies in education, in particular, ICT;
- work with information in global computer networks on the basis of its critical analysis;
- use of various means of communication with students and colleagues, including ICT;
- design of e-learning resources;
- popularization of the results of own research with the help of electronic portfolio.

Table 2

**Evaluation of digital competence of lecturers according
to the statements "Yes" and "Rather yes than no"**

No	Competences	Ukraine (lecturers), %	Ukraine (students), %	Poland (lecturers), %	Poland (students), %
1	introduction of innovative learning technologies, in particular ICT	96.8	94.0	53.4	82.9
2	work with information in global computer networks on the basis of its critical analysis	92.0	91.8	60.0	80.5
3	use of various means of communication with students and colleagues, including ICT	96.0	94.8	73.3	90.2
4	design of e-learning resources	84.8	88.9	20.0	69.5
5	popularization of the results of own research with the help of electronic portfolio	80.0	90.7	66.7	78.6
Average		89.9	92.1	54.7	80.3

Source: Own work

We would also mention that lecturers, involved in the experiment, carried out a self-assessment of their professional activities. At the same time, students determined their own expectations regarding activities of lecturers by giving the answer. They actually were developing a "perfect model" of a modern higher school teacher.

As Table 2 shows, the level of actual lecturer's readiness to confident, critical and responsible use and interaction with digital educational technologies is lower than students have. Perhaps, the higher rates in the Ukrainian sample are due to the fact that the study was conducted on the basis of the University, based in the capital, which has modern material and technical equipment and an existing program to improve the digital competence of lecturers, which is not a rule for most regional universities in Ukraine.

Interestingly, both Polish and Ukrainian students, modelling the teacher's activity, evaluate digital competence higher than teachers (Ukrainian sample: 92.1% and 89.9%, respectively, Polish sample: 80.3% and 54.7%, respectively).

It should also be noted that in the Polish sample there is a statistically significant difference between the views of students and teachers. It is established that $\chi_1^2=15,667$, $\chi_2^2=13,277$, $\chi_2^2 > \chi_1^2$ for the level of significance, $p \leq 0,01$, where χ_1^2, χ_2^2 is the empirical and critical value of the Pearson criterion.

In the Ukrainian sample, the difference between the views of students and teachers is not statistically significant. It is established that $\chi_{\text{emp}}^2=2,548$, $\chi_{\text{kp}}^2=13,277$, $\chi_{\text{emp}}^2 < \chi_{\text{kp}}^2$.

Let us consider the results of the experiment in the context of national samples.

It should be noted that clarification of the general attitude of groups of respondents to the definition of digital competence of higher school lecturers was not fundamental. According to the research which took place at progressive capital university, the most important thing was to find out how the groups differ by the established statement "Yes", which is considered as an indicator of the real readiness of lecturers to changes, the definition of their own decisive position.

Thus, 60% of Ukrainian lecturers note that they are constantly introducing new innovative technologies in education, including ICT, and 36.8% are in the zone of instability and partially use these technologies. Students' responses almost coincide with teachers' assessments, which indicates the real state of the use of ICT in education.

Statistical analysis showed that teachers aged 41 to 55 (62.2%) and those aged 56 to 70 (66.7%) were more active in using ICT. Candidates of Science are more active in using ICT (66.1 %) compared to Doctors of Science (46.2 %).

Continuing the analysis, in our opinion, quite controversial is the fact that teachers' determination to ensure professional self-improvement, the use of ICT in the educational process is not correlated with their willingness to work with information in global computer networks based on critical analysis – 48.8 %. In our opinion, this fact is evidence, on the one hand, of the lack of necessary knowledge and skills to deal with information, to select necessary information and apply in the educational process, and, on the other hand, of low motivation to work with it. At the same time, the teachers' ability to work with information in global networks significantly expands their professional capabilities, increases the technological effectiveness and quality of the educational process.

The greatest willingness to work in global networks was shown by young lecturers aged 25 to 40 years (50 %), although other age groups (about 48 %) confidently answered this question; 48.8 % aged 41 to 55 years and 42.9 % of respondents from 56 to 70 years have a somewhat unsteady position in this question.

Most Doctors of Science (69.2%) actively work with information in global information sources and critically interpret it. Among lecturers without a degree, the amount is less, only 44.6 %. One of the reasons for this is the insufficient level of scientific critical thinking and development of respondents' thinking operations.

The ability to work with information and use various IT in the educational process (video presentations, distance learning, online courses, etc.) provides the direct designing of electronic learning resources by the lecturer. Only 40 % of teachers confidently replied that they design such resources, 44.0 % are not always ready for such work, and more than 15% do not know how to do it, so categorically replied "no". Students were more demanding to teachers and 56.5% of them consider it an obligatory component of the lecturer's activity.

According to statistics, young lecturers aged 25 to 40 years (43.1%) and teachers aged 56 to 70 years (47.6%) actively create e-learning courses and, respectively, 39.6 % and 42.8 % noted that "Yes, rather than no". Statistics also showed that only 33.3% of teachers aged 41 to 55 years create such courses, and 51.1% are in the zone of unstable choice and answered "Rather yes, than no". The high level of creation of e-learning courses was demonstrated by Doctors of Sciences (61.5%). The indicator for Candidates of Sciences (37.7 %) and teachers who do not have an academic degree (37.5%) was significantly lower. The last category of lecturers (more than 25%) has chosen "Rather no, than yes" and "No".

It should be mentioned, that the quality of the implementation of digital technologies into the practice of University education largely depends on the ability of teachers to build interaction with students on the competence basis using a variety of interactive methods. The advantage of self-study work in the structure of students' cognitive activity, interactive methods of working with them, moving from the traditional forms of organization of the educational process makes the interaction of the lecturer with students the dominant of his professional and pedagogical activity. 74.4 % of lecturers claim that they actively use various means of communication with students and colleagues, including ICT. This figure correlates with the one, shown by students, - 70.6 %. All age groups of lecturers surveyed (the same indicators ranging from 70,0% to 75,5%) showed active communication with students and colleagues, including using ICT. According to the academic degree, the least ready for such communication were Doctors of Sciences (69.2 %), and the most active – Candidates of Sciences (77.4 %).

One of the most important components of the professional activity of lecturers of higher education is the scientific work. Every higher school teacher, carrying out scientific research, necessarily considers its presentation and the dissemination of its results. It happens through scientific publications, presentations at conferences, seminars, but does not exclude popularization through lectures, the use of their own scientific research in the process of teaching, starting their own

scientific school, creating a personal scientific portfolio, in particular electronic, opened to the wider public. Thus, we are interested in finding out the opinions of lecturers on the need to disseminate their research results.

In the context of our research, 49.6% of respondents clearly approve dissemination of their scientific research through an electronic portfolio. Another 30.4% fluctuate, but are inclined to answer "Rather yes, than No". So, 79.6% of respondents show a positive attitude to the electronic portfolio as a means of popularizing their own research. The answer "No" was given by 5.6%, including 43% - Candidates of Sciences. A shaky position "Rather No, than Yes" was shown by 14.4% of respondents. Among them, 44.5% of lecturers with scientific degrees, including Doctors of Sciences aged between 41 to 55.

In the examined group of Polish academic teachers, women (76%) dominated over men (24%). The largest age group was 41-55 years (49%), the age 25-40 constituted 35% and 56-70% - 16% of the respondents. As the declared scientific degree or title is concerned, the largest group were doctors (Ph.D. holders) - 55%; there were 25% of doctors with habilitation and 20% of M.A. holders. The respondents represented similar groups as regards work seniority - 37% of people working for 11-20 years, 33% - more than 20 years and 30% - less than 10.

Most frequently, the surveyed academic teachers treated interactive collaboration with students as the most effective in the learning process. A similar number of respondents answered rather yes than no (38%) and yes (37%). In the group of teachers who are more sceptical about the interactive form of contact, 21% provided the answer "rather no than yes" and 4% - "no".

Most frequently, the surveyed academic teachers treated interactive collaboration with students as the most effective in the learning process. A similar number of respondents answered "rather yes than no" (38%) and "yes" (37%). In the group of teachers who are more sceptical about the interactive form of contact, 21% provided the answer rather no than yes and 4% - no.

Much more negative attitudes were observed among the respondents in the case of the reforms and changes taking place in higher education - 41% answered rather no than yes, 38% - "rather yes than no". A similar number of teachers provided extreme answers - 11% - no and 10% - yes.

The surveyed academic teachers are mostly satisfied with the effects of their professional work - positive answers prevailed here: yes - 46% and rather yes than no - 41%. Only 3% of respondents claimed they were dissatisfied and 10% declared the answer rather no than yes.

Over a half of the respondents (54%) stated that they perceive the young as a generation of particular values and needs, 35% chose the answer rather yes than no. Only 11% declared the answer rather no than yes. In the case

of this and the next question, nobody declared the answer no. Almost all surveyed academic teachers consider themselves to be open to communication and aiming at understanding and solving complicated situations – 70% answered yes and 29% - “rather yes than no”. The quantitative distribution of data is similar in the next question, concerning the promotion of tolerance for differences among people in multicultural environments. The answer yes was chosen by 67%, “rather yes than no” – by 30%, the answers rather no than yes and no were declared by 2% per each.

In the case of implementing internationalization, the most frequent answer was rather yes than no – 35%, 30% declared the answer yes. A similar number of respondents answered that they do it in a rather small scale (27%), the definitely negative answer was chosen by 8% of teachers. The activities associated with publishing the research results were more favourably evaluated, which seems obvious due to the annual requirements concerning scientific achievements, imposed in Poland on academic teachers. 67% chose the answer yes, 29% - rather yes than no, and only few (2% and 2% respectively) declared their poor engagement in such activity. What might surprise in the context of these data are the answers to the question pertaining to diagnostic tools for analysing scientific data. 46% chose rather yes than no, 24% declared yes, but as many as 24% stated that they do this rarely and 6% that not at all. (Grabowska, Kwadrans, Minczanowska, Smyrnova-Trybulska, Szafrńska 2019)).

During the analysis of research results, the following was also conducted: the comparison of the ratios of academic teachers’ and students’ competences profiles according to Pearson’s χ^2 criteria (for each profile separately).

Vocational-pedagogical profile: Empirical significance/value - 1.196381457; Critical significance/value ($\alpha=0.05$) - 7.814727903; Critical significance/value ($\alpha=0.01$) - 11.34486673. Conclusion - No statistically significant differences.

Social-personal profile. Empirical significance/value - 1.765328537; Critical significance/value ($\alpha=0.05$) - 7.814727903; Critical significance/value ($\alpha=0.01$) - 11.34486673. Conclusion -. No statistically significant differences.

Academic profile. Empirical significance/value - 0.610498839; Critical significance/value ($\alpha=0.05$) - 7.814727903; Critical significance/value ($\alpha=0.01$) -. Conclusion - 11.34486673. No statistically significant differences.

Thus, digital competence of the lecturers involves using ICT technologies in the process of professional training and the creation of new information resources. Their availability is changing the traditional model of the educational process, creating conditions for the development of a multi-component educational model, interactive virtual environment, reshaping the interaction technology of its subjects. Considering the above mentioned the competence of a academic teacher in working with information on the basis of critical thinking, using ICT and creation of new information resources requires further development.

The essence of this process is to expand lecturer's understanding of the informational environment, to familiarize with new informational trends and opportunities for their use. ICT should be improved for teachers between the ages of 41 and 55, as well as for those without a degree.

The obtained research results show that the competences presented in the three discussed profiles are highly valued by both academic staff and students. However, they require constant raising in order to step further from the level of declarations or expectations (often different than the reality) to the stage of their professional applications. This has been and currently is facilitated within various projects, supported by outer resources from EU or national projects. Yet, our recommendations promote making the changes and support for the development of academic teachers' competences within all the three profiles an element of academic curricula and system organizational-institutional reforms – not only incidental implementation of projects. Without certain continuity and permanence in this scope, it will be difficult to achieve the desired change – increased competences of academic staff, and in turn better quality of educating students and conducting scientific research. (Grabowska, Kwadrans, Minczanowska, Smyrnova-Trybulska, Szafrńska 2019)).

3.2. Positive experience of universities of Ukraine and the Republic of Poland in improving the level of digital competence of teachers

The study found that the goals and values of higher education in project participating countries are more similar than different. In the competence space of lecturer's activities, we have identified common competency guidelines, which are associated with social, cultural, economic challenges, evolution of educational goals of the EU. Among the basic guidelines is digital competence, contributing to the implementation of the unification processes in the EU education and the ICT revolution, as well as the interaction of participants in the educational process, the adaptation of the individual to constant changes etc.

As practice shows, the Borys Grinchenko Kyiv University (Ukraine) and Silesian University in Katowice (Poland) have positive experience in improving the level of digital competence of lecturers. We are sure that such experience should be taken into account in the organization of activities at other universities in our countries. Here are some examples of activities aimed at improving the digital competence of lecturers.

1. Thus, the program of professional development of lecturers aiming at their competence development is implemented at Borys Grinchenko Kyiv University. Since 2015, the University has been operating a prolonged system of professional development in the context of the development of professional, didactic, research, digital and leadership competencies of lecturers. Within the framework of the professional development program, a content module "Information and communication technologies" was organized, aiming at developing lecturers' general ideas about the ways and prospects

of informatization in education; the ability and sense of the need for continuous self-education and self-improvement, the use of innovative pedagogical and digital technologies, web 2.0 services in the educational process (Educational program, 2015).

The program of the content module comprises the following topics:

- "Modern educational trends and ways to implement innovative technologies and ICT in the educational process";
- "Blended learning. E-learning technologies. Resources for creating e-content and criteria for its evaluation";
- "21 century skills. Internet services and IC technologies for effective communication";
- "Internet services and IC technologies of effective cooperation";
- "Internet services and IC technologies for formative assessment".

Lecturers use resources to create e-content, a variety of Internet services and information technologies for effective communication, cooperation and monitoring the quality of the educational process. In addition to this module, every lecturer can improve digital competence while developing and certifying an e-learning course to implement e-learning.

2. The University has developed the Corporate standard of digital competence of a lecturer, presented in the form of a model that covers various activities of lecturers (educational, scientific, professional development etc.) and tools to measure of digital competence within three components: technological literacy, knowledge deepening and knowledge creation. Technological literacy includes: familiarity with educational policies, basic ICT tools, basic knowledge (insufficient use of ICT in the educational process), basic knowledge in scientific communication, and ICT literacy (formal studying ICT). The second component – extending of knowledge includes: understanding of educational policy through ICT, complex ICT tools, the use of knowledge (systematic use of ICT in the educational process), the use of knowledge in scientific (including virtual) communication and electronic scientific cooperation, management and coordination (non-formal education in ICT). The third component (creation of knowledge) comprises the following components. These are innovations in educational policy, latest technologies, skills of the society of knowledge, skills of implementing scientific projects, and training in open access courses. We also highlight the most important tools for measuring the technological literacy of teachers of higher school:

* Survey to identify teachers' awareness of the availability of educational policy documents (at the state or University level) and their role in University activities.

- Self-checking tasks to test levels of knowledge of the basic tools.

- Survey of students on the quality of ICT usage in the educational process.
- E-testing of educational achievements of students.
- The availability of EEC on the LMS Moodle platform.

* Questioning teachers to understand the effectiveness of ICT usage in practice.

- Survey of teachers on awareness of the use of scientific communication: repositories, scientometric databases, e-libraries, e-magazines, online conferences.

Citation index in Google Academy, etc. (Corporate standard 2015).

3. In order to ensure the accumulation, systematization and storage of intellectual products of the University in electronic form, the University operates the Institutional repository of the Borys Grinchenko Kyiv University, which is designed for the accumulation, systematization and storage of intellectual products of the scientific community of the University in electronic form, providing open access to them by means of Internet technologies, distribution of scientific materials in the world scientific space (Regulations 2015). It is an open-access resource, located on the University server on the Internet and accessible from any place and at any time.

The repository allows you to view and sort information by criteria: year, subject (abstracts, dissertations, reports on scientific projects, reports of structural units, monographs, musical works, teaching materials, manuals, scientific publications, scientific conferences, scientific schools, normative documents, patents for inventions, textbooks, certificates, certificate for registration of copyright for a scientific work, dictionaries, encyclopedias, reference books, articles in journals, articles in scientometric databases), structural unit and author.

The University of Silesia e-learning platforms provide students with more than 8,000 hours of effective work (<http://el.us.edu.pl>), The Faculty of Ethnology and Sciences of Education has developed a distance learning platform for training and educational activities (<http://el.us.edu.pl/weinoe>). IRNet Project (www.irnet.us.edu.pl) e-learning course ICT-tools for e-learning (<http://el.us.edu.pl/irnet>) includes more than 10 topics devoted innovative ICT-tools and methods, elaborated by dozens of experts from 10 countries, aimed at academic teacher and future teachers. This core graduated above 110 learners. At the end of the year there will be prepared upgraded MOOC in Edex system.

Distance Learning Center of the University of Silesia provides technical support, course administration and training for teaching staff and students. On the platforms of the Center for Distance Education at the University of Silesia, from the beginning of the activity there were registered 133 850 users who used teaching support in the remote mode. This year, 24,800 active platform users have been registered. 1556 EL teaching support courses have been developed.

Open Source publication (e.g., Repository (<https://rebus.us.edu.pl>), digital Library (www.ciniba.us.edu.pl), includes more than 100 000 publications; Bibliography of the work of the employee of the University of Silesia. The repository of the University of Silesia RE-BUŚ was established in order to disseminate scientific achievements of employees, promote scientific research conducted at the University of Silesia, as well as to support didactic processes. RE-BUŚ contains full texts of publications of employees, associates, doctoral students and students of the University of Silesia. The creation of the University of Silesia Repository was co-financed by the Ministry of Science and Higher Education (Agreement No. 645 / P-DUN / 2017).

The Flagship Initiatives for the three aforementioned priorities are as follows:

Smart growth: Digital Agenda for Europe; Innovation Partnership; Youth on the move.

Sustainable growth: A resource-efficient Europe. Industrial Policy for a Globalised Era.

Inclusive growth: Agenda for new skills and jobs. The European Platform Against Poverty and Social Exclusion.

Poland's *National Reform Programme* is part of a broader initiative intended to develop an effective system shaping the country's policy (Strategy of University of Silesia on 2012-2020).

3.3. Recommendations of research teams on improving the digital competence of lecturers

The conclusions made by international research teams regarding the results of the diagnostics of lecturers' digital competencies and their generalization give grounds for justification of recommendations on certain changes that should be implemented at the institutional, and national levels.

1. The beginning and holding of the international (Polish-Ukrainian) summer school for the development of digital competence of higher school lecturers (rough topics: "Academic integrity as a guarantee of the formation of a modern scientist in the information space", "Ethical, legal and socio-cultural problems of the information society", "Formal and informal education in informatization environment", "Communication and information: points of contact", etc.)
2. Clarification of the structure of digital competence of higher school lecturer, monitoring of its formation in accordance with certain components.
3. Organization and holding of a series of master classes "Using software and hardware ICT in higher school."
4. Holding a scientific and methodological seminar on digital intelligence: using digital content in everyday life and in professional activities.

5. Joint scientific publications on comparison research in the *International Journal of Research in E-learning* (<http://weinoe.us.edu.pl/nauka/serie-wydawnicze/international-journal-research-e-learning>), which got the grant of Ministry of Science and Higher education, recommendation for publication in area Pedagogy discipline and 20 points.

CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH

1. The results of the international project "Competencies of a higher school lecturer in the epoch of changes" (No 21720008) aimed at diagnosing a number of competences of higher school lecturers in Ukraine and Poland indicate a fairly low level of formation of such a system-forming competence as a digital one.
This competence comprises the ability to new, which is realized when using ICT technologies in the process of professional training and the creation of new information resources. Their availability changes the traditional model of the educational process, creates conditions for the development of a multi-component educational model, interactive virtual environment, reshaping the technology of interaction of its subjects. Considering the above mentioned, the competence of lecturers in working with information on the basis of critical thinking, using ICT and the creation of new information resources requires further development.
2. The positive experience of Borys Grinchenko Kyiv University and the Silesian University in Katowice in improving the digital competence of lecturers includes the development of lecturers' general ideas about the ways and prospects of informatization in the field of education; the ability and sense of the need for continuous self-education and self-improvement, the use of innovative pedagogical and digital technologies, Web 2.0 services in the educational process.
3. The recommendations of research teams regarding the improvement of the digital competence of higher school lecturers are prepared. They cover the organization and holding of a number of activities (summer school, workshops, seminars, etc.), clarifying the structure of digital competence of teachers, etc.
4. Presentation and dissemination of research results on the International Scientific Conference *Theoretical and Practical Aspects of Distance Learning* (www.dlcc.us.edu.pl) and publications of joint articles in the scientific monograph series on E-learning (<http://weinoe.us.edu.pl/nauka/serie-wydawnicze/seria-e-learning/seria-e-learning>), indexed in Web of Science.

The provisions considered in the paper do not dwell on all aspects of the problem studied. The development of methods for the use of digital technologies for the implementation of the program of competence development of lecturers

of higher school will be the subject of further scientific research.

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