

Significance of Open Educational Resources for Forensic Expert Training

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DOI: [10.32353/khrife.4.2022.0](https://doi.org/10.32353/khrife.4.2022.0) UDC 342.9:378

Received: 28.11.2022 / Reviewed: 02.12.2022 / Accepted for Print: 06.12.2022 /

Available online: 30.12.2022



The issue of ensuring forensic expert training in conditions of online education with the help of open educational resources has been analyzed. Research and development of National Scientific Center «Hon. Prof. M. S. Bokarius Forensic Science Institute» concerning the project implementation “Open Educational Resource: Forensic Science” which research results are educational materials on forensic science, developed in order to freely use them during forensic expert training in Ukraine and abroad, have been presented. The main created video content has been analyzed in relation to the essence of outlined issues and importance of educational product for future experts. The practical value of the educational resource has been emphasized thanks to the high level of technical equipment use at the research institution. European experience of using available educational resources while training experts in the field of law at Rīga Stradiņš University has been considered. Expediency of applying such experience to the practice of such

This article is translation of the original Ukrainian content, which source is available at the link: <https://khrife-journal.org/index.php/journal> (translated by Daryna Dukhnenko). The author acknowledges translation as corresponding to the original.

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training in Ukraine has been determined. The research paper studies into demand for free educational resource which was confirmed by the range of approbation events both in Ukraine and in Latvia. The research suggests continuing to expand capabilities of free access under conditions of forensic expert distance learning, introducing international educational resources into mandatory educational and methodological support of educational programs. The Article purpose is to develop theoretical provisions and practical recommendations concerning implementation of open educational resources in the course of forensic expert training. To fulfil this goal, general scientific methods of theoretical generalization, comparison, systems analysis and formalization have been applied.

Keywords: open educational resource; distance learning; accessibility; education; forensic expert.

Research Problem Formulation

Transition to digital technologies is one of current global stages of society development, resulting in becoming a determining factor in growth of any sector that has joined digitalization. Tendencies to strengthen information flows, formation of new consumer requests gave rise to transformation of digital technologies for ensuring processes of their optimization, automation, improvement of communication between partners and increase in efficiency of decision-making in the world. Ukraine also has joined these processes since the beginning of European integration cooperation with the European Union. Today, development of digital industry in Ukraine is a component of the strategic areas of its development and is fully supported by the state, as evidenced by activities of the Ministry of Digital Transformation¹. Thus, the main focus indicated by the Ministry until 2024

is implementation of dozens of projects aimed at one hundred percent provision of available online public services. The issue of accessibility is a significant component of modern life, and a constantly changing environment stresses the need for introduction of digital technologies in all sectors.

The development issue of digitization in Ukraine has gained particular relevance due to the need to adapt economy, science and other areas to changes related to the coronavirus pandemic and the war in Ukraine, which started in February 2022. As a result of infrastructure destruction, many sectors of national economy have been affected; and the need to tackle the issue of maintaining proper life support has become the basis for strengthening digitalization as a mandatory component of renewable processes in Ukraine. Education has suffered heavy losses along with other sectors. Since the beginning of the Russian Federation full-scale invasion, more than

1 Міністерство цифрової трансформації України. URL: <https://thedigital.gov.ua/> (date accessed: 15.11.2022).

2,400 educational institutions have been damaged or entirely destroyed ², requiring an urgent need to ensure (in addition to restoration) a continuous educational process, which is possible within the distance learning.

The list of modern digital tools helping to fulfill this task is diverse, while the degree of access to these tools and their free use is not out of focus. During the martial law ³, the Ministry of Education and Science of Ukraine implemented a project on its official website enabling general secondary educational institutions to use electronic textbooks ⁴, and thus help students acquire certain competencies in distance learning conditions. The Ukrainian European integration portal has placed materials available to every user for mastering issues of European Union legislation implementation ⁵. Other institutions are gradually being drawn into this: this process is ongoing.

Consequently, the amount of available educational resources in Ukraine is constantly growing. The bulk of state support is provided to secondary education. In return, higher education remains autonomous in implementing free access to educational projects. Postgraduate

education has a similar problem, which is actually forced to independently train top-qualified specialists under conditions of online education.

Forensic science sector does not stand aside from these problems, and even more: forensic experts training within the framework of advancing their qualifications necessitates the introduction of individual training programs taking into account specificity of acquired knowledge and peculiarities of the mission of expert institutions in ensuring justice in Ukraine. Training of forensic experts and advancing their qualifications within a specific specialization under critical learning conditions requires widening access to educational Internet resources.

Analysis of Essential Researches and Publications

The majority of domestic researchers attempted to resolve the issues of forensic experts' training. For example, S. O. Strilets and R. V. Kuznetsov ⁶ in their research focused on shortcomings of the current system of personnel training for the Expert Service of the Ministry of Internal Affairs, emphasizing the need to improve it by considering corresponding European

- 2 2400 закладів освіти постраждали від бомбардувань та обстрілів, 269 з них зруйновані повністю, – Сергій Шкарлет / Міністерство освіти і науки України. URL: <https://mon.gov.ua/ua/news/2400-zakladiv-osviti-postrazhdali-vid-bombarduvan-ta-obstriliv-269-z-nih-zrujnovani-povnistyu-sergij-shkarlet> (date accessed: 15.11.2022).
- 3 Про введення воєнного стану в Україні : Указ Президента України від 24.02.2022 р. № 64/2022 (зі змін. та доп.). URL: <https://zakon.rada.gov.ua/laws/show/64/2022#Text> (date accessed: 15.11.2022).
- 4 Електронні підручники для навчання в умовах воєнного стану розміщено у вільному доступі / Міністерство освіти і науки України. URL: <https://mon.gov.ua/ua/news/elektronni-pidruchniki-dlya-navchannya-v-umovah-voennogo-stanu-rozmisheno-u-vilnomu-dostupi> (date accessed: 15.11.2022).
- 5 Інфографіка та освітні матеріали / Євроінтеграційний портал. URL: <https://eu-ua.kmu.gov.ua/infografika> (date accessed: 15.11.2022).
- 6 Стрілець С. О., Кузнецов Р. В. Шляхи вдосконалення підготовки та підвищення кваліфікації судових експертів Експертної служби МВС. *Молодий вчений*. 2020. № 9 (85). С. 236–241. DOI: [10.32839/2304-5809/2020-9-85-51](https://doi.org/10.32839/2304-5809/2020-9-85-51) (date accessed: 15.11.2022).

experience. S. H. Hasparian ⁷ dedicated her dissertation research to the study of individual aspects of forensic science institutions staffing, seeing improvement in the process of qualified specialists' training through amendments in administrative legislation. The practice of training forensic experts in higher education institutions was studied by V. M. Baraniak ⁸, paying attention to the need to reform of organizational and educational support for forensic experts' training. I. A. Petrova and O. P. Sniherov ⁹ considered options for advancing the system of forensic experts training at research institutions of the Ministry of Justice of Ukraine by motivating them. In his research paper, V. V. Khosha ¹⁰ emphasizes the need to eliminate legislative flaws while scientific staff training in the field of law, presenting ways to overcome shortcomings by expanding activities of forensic science institutions with the help of educational tasks.

An extensive list of publications by modern authors on this topic strengthens its relevance, but the issue of introducing free educational resources for forensic expert training is not viewed by modern researchers and specialists, and the subject of research in most research papers is legal component of the process. Therefore,

informational or educational component of the process of forensic expert training necessitates further research.

Article Purpose

To develop of theoretical provisions and practical recommendations regarding introduction of open educational resources while forensic experts' training.

Research Methods

General scientific methods of theoretical generalization, comparison, systems analysis and formalization.

Main Content Presentation

In conformity with the Regulations on the Central Expert Qualification Commission under the Ministry of Justice of Ukraine and certification of forensic experts ¹¹, specialists who seek to obtain or confirm forensic expert qualification must have an appropriate higher education (educational qualification level not lower than a specialist), know legislation of Ukraine on judicial examination and undergo training/internship in the relevant specialization at state forensic science institution, according

7 Гаспарян С. Г. Адміністративно-правові засади кадрового забезпечення судово-експертних установ України : автор. дис. ... канд. юрид. наук. Харків, 2019.

8 Бараняк В. М. Проблеми підготовки судових експертів у вищих навчальних закладах України. *Вісник Національного університету «Львівська політехніка»*. 2014. № 801. С. 229–233. URL: http://nbuv.gov.ua/UJRN/vnulpurn_2014_801_41 (date accessed: 15.11.2022).

9 Петрова І. А., Снігерьев О. П. Шляхи вдосконалення системи підготовки судових експертів в Україні. *Актуальні питання судової експертизи та криміналістики: мат-ли міжнар. наук.-практ. конф., присвяч. 95-річчю створення Харків. НДІ суд. експертизи ім. Засл. проф. М. С. Бокариуса* (Харків, 10–11.10.2018). Харків, 2018. С. 17–20.

10 Хоша В. В. Питання підготовки наукових кадрів в галузі права за профілем судово-експертної діяльності. *Судова експертиза: сучасність та майбутнє: мат-ли круглого столу* (Львів, 25–26.02.2019). Львів, 2019. С. 136–137.

11 Про затвердження Положення про Центральну експертно-кваліфікаційну комісію при Міністерстві юстиції України та атестацію судових експертів : наказ Мін'юсту України від 04.03.2015 р. № 249/26694 (зі змін. та допов.). URL: <https://zakon.rada.gov.ua/laws/show/z0249-15#Text> (date accessed: 15.11.2022).

to the results of which pass the exam at the Central Expert Qualification Commission in Kyiv. Most of requirements for the forensic expert are of formal nature, but the above-mentioned problems arise precisely at the stage of learning or internship, which under modern circumstances have been transformed into distance learning. The online interaction of a lecturer and a specialist who plans to obtain qualification in one of the expert specializations requires research institutions to make responsible decisions regarding refocusing of training programs and changes in teaching approaches.

In search of efficient means for solving educational problems in conditions of global digitization, it is interesting to study international experience. European countries are more progressive in matters of access to education, which is evidenced by high level of use of electronic libraries and repositories, free use of scientometric databases, professional journals and other educational and methodological support. In fact, every European who aims to obtain specific education has an opportunity to freely use materials of the educational institution where they study. Borrowing such experience is logical and expedient within European integration processes in Ukraine; moreover, the exchange of educational resources will contribute to strengthening of international partnership and increase the quality of specialists training in any field (in particular, forensic science). Future prospects of such

cooperation encourage higher education institutions and research institutions to take active actions in order to expand learning opportunities by providing free access to educational resources.

Thus, in 2021, National Scientific Center «Hon. Prof. M. S. Bokarius Forensic Science Institute»¹² (hereinafter referred to as NSC «Hon. Prof. M. S. Bokarius FSI») was one of the first in Ukraine, along with Rīga Stradiņš University, to implement the large-scale project *Open Educational Resource: Forensic Science*, which provided an opportunity to create basic (essential) educational materials for forensic expert training both in Ukraine and abroad.

Let's note that at the project planning stage, its authors conducted survey among 132 forensic experts as to acceptability of free educational resources for specialists training and the necessity to implement such an approach in practice. Statistically processed results of the questionnaires demonstrate a positive perception of available tools in conditions of education global transformation¹³, and therefore the expediency of research conducted within the project is scientifically proven and determines interest of both foreign educators and Ukrainian forensic science institutions.

What is more, the choice of a Latvian partner is not accidental. The process of forensic experts' training in Latvia is identical to the Ukrainian system of training corresponding specialists, and therefore exchange of knowledge at the

12 Відбувся українсько-латвійський семінар «Відкритий освітній ресурс: судова експертиза. Крок до модернізації методів підготовки судових експертів» / Національний науковий центр «Інститут судових експертиз ім. Засл. проф. М. С. Бокаріуса». URL: <https://www.hniise.gov.ua/14642-vdbuvsya-ukranskolatviskii-semnar-vdkritii-osvtni-resurs-sudova-ekspertiza-krok-do-modernzats-metodv-pdgotovki-sudovix-ekspertv.html> (date accessed: 15.11.2022).

13 Palkova K., Agapova O., Zile A., Polianskyi A., Vadym K., Hasparian S., Mykhailo M. (2022). Sustainability of Open Educational Resources in Forensic Sciences: International Experience. *European Journal of Sustainable Development*. No 11 (3). DOI: [10.14207/ejsd.2022.v11n3p71](https://doi.org/10.14207/ejsd.2022.v11n3p71) (date accessed: 15.11.2022).

international level will contribute to the improvement of distance education and facilitate formation of practical skills in specialists, taking into account a leading Latvian-Ukrainian experience of carrying out expert research¹⁴.

Within the scope of the presented project, open educational resource was introduced with scientific, educational and other materials dedicated to topical issues of forensic science and criminalistics, as well as video presentations of forensic expert work with the possibility of their remote use by end users (higher education applicants of various education levels, researchers, forensic experts of other countries). The created video content contains a video to familiarize listeners with the purpose of the *Open Educational Resource: Forensic Science* project and 9 videos as well as video presentations dedicated to individual types of forensic examinations and that relate to forensic gemological, ballistic and psychological, art, forensic veterinary, biological, engineering and transport examination, as well as questioned document examination and examination of materials, substances and products.

A specialist in specialization 17.1.1 *Research on precious stones*, 17.1.2 *Research on diamonds*, 17.1.3 *Research on precious stones of organic nature*, 17.1.4 *Research on semi-precious stones*, 17.1.5 *Research on decorative stones* introduces types of precious and semi-precious stones (which are forensic examination objects), and the main methods of conducting research on them (organoleptic, instrumental and comparative) using technical equipment of forensic science institution.

The video *Forensic Ballistics Examination* encompasses educational

materials related to forensic examination of weapons and traces as well as circumstances of their use. An expert in weapon research and explosive research demonstrates the main stages of conducting forensic examination, taking into account the specifics of addressed tasks (classification, diagnostic and identification), and also shows the process of empirical experiment with weapons in the shooting range of NSC «Hon. Prof. M. S. Bokarius FSI».

The content of forensic psychological examination (in addition to the outline of its tasks) teaches users how to work with computer polygraph, indicating features of psychophysiological research with application of techniques having passed state certification. Moreover, the video contains educational experiment on the use of modern equipment at NSC «Hon. Prof. M. S. Bokarius FSI» in the course of researching a person's verbal statement about a specific event.

Questioned document examination is presented in video presentations with information on types of research objects and equipment for its implementation. The demonstration of the *Spectrum Expert MF-3* video set and the process of photographing documents with the help of optical filters is quite interesting.

In turn, the *Art Examination* video presentation acquaints the listener with peculiarities of researching antiques and pieces of art. The art connoisseur talks in detail about the task of art examination and provides examples of assessing cultural value of objects, attributing a piece of art, etc.

The next video is dedicated to forensic veterinary examination, research methods of its objects and principle tasks.

14 Відбувся українсько-латвійський семінар ... URL: <https://www.hniise.gov.ua/14642-vdbuvsvya-ukranskolatviskii-semnar-vdkritii-osvtni-resurs-sudova-ekspertiza-krok-do-modernzats-metodv-pdgotovki-sudovix-ekspertv.html> (date accessed: 15.11.2022).

What is more, the presentation shows modern equipment of NSC «Hon. Prof. M. S. Bokarius FSI» for carrying out this type of forensic examination, namely: GCMS-QP2020 gas chromatography-mass spectrometry, with the help of which it is possible to establish availability of unknown substances and/or poisons that could have resulted in the death of animals, and a spectrometer with inductively coupled plasma of the ICPE-9800 series, using which helps to conduct a study in order to establish the presence of heavy metals in submitted objects.

In educational materials forensic biological examination is represented by theoretical aspects of research and demonstration of measuring equipment for its implementation (microscopes and drying cabinet).

Concerning forensic examination of materials, substances and products, the educational video includes information on chemical laboratory of NSC «Hon. Prof. M. S. Bokarius FSI» and its technical equipment.

The last presentation is dedicated to forensic engineering and transport examination. It informs users about tasks of automotive engineering, transport and trace evidence examinations as well as railway transport examination. Demonstration of computer programs enabling to simulate movement and collision of vehicles are of particular note. Using the PC Crash program, a forensic expert can visualize the mechanism of traffic collision. In the video, users can thoroughly study the impact models that the program calculates in dynamics. Also, the educational material contains information about 6 modern pieces of equipment helping the forensic expert in road technical research (decelerometer,

steering angle converter, automatic press, etc.). In addition, NSC «Hon. Prof. M. S. Bokarius FSI» has a laboratory for researching asphalt concrete mixtures, technical equipment of which is presented in the video content.

Thus, while using created educational resources, you can not only get acquainted with theoretical foundations of a particular type of forensic examination, but also get practical research skills by testing modern equipment of NSC «Hon. Prof. M. S. Bokarius FSI».

Undoubtedly, application of the developed content solves organizational problem of forensic expert training in the online mode in Ukraine, but the *Open Educational Resource: Forensic Science* project can also benefit outside the country. In order to test this hypothesis, developers have carried out a number of approbation measures, which purpose is to determine acceptability of carried out research work, to assess quality of obtained educational product and ensure its distribution among European scientific community.

To familiarize yourself with the essence of the *Open Educational Resource: Forensic Science* project and acquired results, many research papers have been published, in particular in editions cited in the abstract and citation databases Scopus, Web of Science¹⁵.

In order to discuss challenging aspects of creating a free educational space for forensic experts training, the panel discussion *The Impact of the Ukrainian-Latvian Research Project "Open Educational Resource: Forensic Science" on the Mechanisms of Implementing Educational Activities in the Field of Expert Support of Justice* was held within the framework of the international scientific and practical

15 Palkova K., Agapova O., Zile A. OER as a Tool for Sustainable Development: The Ukrainian – Latvian Experience of Forensic Science Experts. *European Journal of Sustainable Development*. 2021. Vol. 10. No. 3. P. 15–26. DOI: [10.14207/ejsd.2021.v10n3p15](https://doi.org/10.14207/ejsd.2021.v10n3p15) (date accessed: 12.11.2022).

polylogue conference *Relevant Issues of Forensic Science and Criminalistics*¹⁶.

To maintain continuous communication between project participants, a joint Ukrainian-Latvian page was created on Facebook (META)¹⁷.

To exchange practical experience on issues of experts training, the educational resource developing countries have also organized seminars, one of which was held online at NSC «Hon. Prof. M. S. Bokarius FSI», and the second: during authors' business trip to Latvia.

Testing of the project proves the demand for the developed educational content, its relevance, and also strengthens international partnership.

Available advantages of the introduction of open educational resources encourage further broaden possibilities of application of the *Open Educational Resource: Forensic Science* project. With the purpose of deepening this process, it is suggested to thoroughly compare educational materials for conducting expert research at European forensic science institutions with practice in Ukraine and to encourage partners to continue exchanging experience, and at the same time it is necessary to add video presentations to the training program / internship of forensic experts at advanced training courses of NSC «Hon. Prof. M. S. Bokarius FSI», by placing content for free access on the official website of this institution; disseminate information about available educational materials among colleagues from other forensic science institutions, inviting them to join the

process of bilateral exchange of experience for educational purposes.

Thus, results dissemination of the *Open Educational Resource: Forensic Science* project contributes to advancement of educational direction at NSC «Hon. Prof. M. S. Bokarius FSI» and improves effectiveness of forensic experts' training in conditions of distance learning. Creation of open educational resource enables to supplement existing educational (instructional) materials, thus facilitating easy familiarization with a certain type of forensic examination and contributing to more effective acquisition of knowledge, skills and abilities by future forensic experts. Furthermore, international exchange of knowledge between forensic science institutions in the field of specific expertise has a positive effect on the formation of practical skills in specialists.

Conclusions

The experience of the Ukrainian-Latvian partnership is an example of accessibility and availability of educational resources that demonstrate a voluminous information array, enabling the user to self-educate in the chosen area and receive corresponding training necessary for development of professional competences. Implementation of projects aimed at providing free access to teaching materials helps not only adapt to conditions of online learning, but also expand educational opportunities of students. Thus, forensic experts' training within the framework

16 Агапова О. В. «Відкритий освітній ресурс: судова експертиза». Крок до модернізації методів підготовки судових експертів. *Актуальні питання судової експертизи і криміналістики* : мат-ли міжн. конф.-полілогу (Харків, 15–16.04.2021). Харків, 2021. С. 301–302 ; Zile A. Development of forensic institute in the republic of Latvia. *Ibidem*. С. 302–304 ; Grasis J., Palkova K. Open educational resource and forensic science: challenges and future perspectives for the higher education. *Ibidem*. С. 306–308. URL: https://www.hniise.gov.ua/uploads/files/public-folder/2021_tezy_konferencija%20in%20print5.pdf (date accessed: 15.11.2022).

17 Open Educational Resource: Forensic Science / Facebook. URL: <https://www.facebook.com/OERForensicScience> (date accessed: 15.11.2022).

of the *Open Educational Resource: Forensic Science* project enables Ukrainian and Latvian experts to exchange experience, positively influencing their expertise, and remotely get required theoretical and practical basis for further professional activities.

Значення відкритих освітніх ресурсів для підготовки судового експерта
Дар'я Давиденко, Карина Палкова, Юлія Шпак

Розглянуто питання щодо забезпечення підготовки судового експерта в умовах онлайн-навчання за допомогою відкритих освітніх ресурсів. Представлено наукові доробки Національного наукового центру «Інститут судових експертиз ім. Засл. проф. М. С. Бокаріуса» щодо реалізованого проєкту «Відкритий освітній ресурс: судова експертиза», наукові результати якого — навчальні матеріали з питань судової експертизи, зібрані з метою їх вільного застосування під час підготовки судового експерта в Україні та за її межами. Проаналізовано основний створений відеоконтент щодо сутності висвітлених питань і користі навчального продукту для майбутніх фахівців. Відзначено практичну цінність освітнього ресурсу завдяки високому рівню застосування в ньому технічного обладнання наукової установи. Вивчено європейський досвід застосування доступних освітніх ресурсів під час підготовки фахівців у галузі права Ризького університету імені Страдіня. Визначено доцільність перенесення досвіду на практику здійснення такої підготовки в Україні. Досліджено затребуваність відкритого освітнього ресурсу, що підтверджена низкою апробаційних заходів як в Україні, так і в Латвії. Запропоновано продовжувати розширення можливості вільного доступу в умовах дистанційного навчання судового експерта, запроваджуючи міжнародні освітні

ресурси в обов'язкове навчально-методичне забезпечення освітніх програм. Метою статті є розроблення теоретичних положень та практичних рекомендацій щодо запровадження відкритих освітніх ресурсів під час підготовки судового експерта. Для досягнення мети використано загальнонаукові методи теоретичного узагальнення, порівняння, системного аналізу та формалізації.

Ключові слова: відкритий освітній ресурс; дистанційне навчання; доступність; освіта; судовий експерт.

Financing

This research did not receive any specific grant from funding institutions in the public, commercial or non-commercial sectors.

Disclaimer

Founders had no role in the study design, data collection and analysis, decision to publish or manuscript preparation.

Participants

Authors contributed solely to the intellectual discussion underlying this document, case law research, writing and editing and assumes responsibility for its content and interpretation.

Declaration of Competing Interest

Authors declare no conflict of interest.

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