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Sustainability of Open Educational Resources in Forensic Sciences: International Experience

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Abstract
Open educational resources are among the important factors that affect the quality of contemporary education. The new form of education has been recognised by UNESCO and has become an important element in reaching sustainable development goals in educational sector. This article covers the experience of using open educational resources for expert support in justice, based on international experience. To identify the possibility of using open educational resources in the specific area of forensic experts' education, the authors of the article have conducted a survey among expert community, and the survey results are presented in this study. Representatives of expert institutions from Bosnia-Herzegovina, Bulgaria, Czech Republic, Georgia, Germany, Greece, Israel, Latvia, Montenegro, Poland, Slovenia, Ukraine and other countries have participated in the survey. The analysis of survey results shows that the introduction of open educational resources is acceptable for most respondents. It was found that 'OER: Forensic Science' project is going to be the first educational content of the kind to be introduced in forensic expert institutions and universities entitled to support educational activities. It is proven that open educational resources can enhance quality of the learning process at two levels at least. First, it is the quality of teaching and secondly, it is the new digital approach to learning environment that allows access to all studies necessary to perform forensic expert activities.

Keywords: OER, education, forensic expert, international experience

1. Introduction

Education is the major driver for society development. Recognising the importance of education which is a prerequisite for peace, unlocking human potential and sustainable development, we believe that the matters of generating and implementing the new education concept are particularly topical. The implementation of the new education concept is about transforming human lives using educational technology, which includes also open educational resources.

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The UNESCO emphasizes that common access to information through high quality education facilitates sustainable social/economic development and cross-cultural dialogue. Open educational resources provide a strategic opportunity to enhance the quality of education and knowledge exchange and to improve the political dialogue throughout the world. The introduction of open educational resources in the system of education is specified in the Sustainable Development Goal 4: "*to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*" by 2030 (The Sustainable Development Agenda, Goal 4, 2020).

According to Incheon Declaration and Framework for Action for implementation of Sustainable Development Goal 4, the developed tertiary education systems supported by technology, open educational resources and distance education can increase access, equity, quality and relevance, and can narrow the gap between what is taught at universities and what economies and societies demand (The Sustainable Development Agenda, Goal 4, 2020).

The major goal is to make tertiary education free and affordable in accordance with the international treaties.

Obviously, the introduction of open educational resources in various areas of education and science is the driver behind reaching the Sustainable Development Goal 4. The 'OER: Forensic Science' project is aimed at enhancing the educational/scientific activities in the specific area of forensic science and at implementation of Sustainable Development Goal 4 (The Sustainable Development Agenda, Goal 4, 2020).

The objective of this research is to identify current trends in the application of open educational resources based on integral analysis of their implementation by foreign international expert community, expert institutions and universities.

The academic novelty of obtained results is that the study is the first to address the current trends in establishing open educational resources, the specifics of their application by foreign expert institutions, and draws the conclusions proving their importance for the improvement of educational/scientific mechanisms in the area of forensic support of justice.

2. Materials and Methods

To provide the overview of the OER in the field of forensic science in Latvia and Ukraine, authors will contribute the insights with respect to the issues such as infrastructure of OER in both countries and the topical questions of legal basis for forensic science experts from the educational field perspective. The international documents as well as Latvian and Ukrainian national acts will be analysed. Statistical survey results in the field of OER and forensic expert education held among expert institutions will be provided. The research will focus on the views of forensic scientists and most relevant studies will be presented in the article. The following methodological approach will be applied in the article. Descriptive research will be made by authors, the current situation will be described in the field of forensic OER. Conceptual research will be provided to develop new concepts of digital education in forensic science field. Evaluative research will help to assess current situation in comparative law perspective. It must be noted that other specific methodological approaches will be used as well.

3. Research and Methodology

The correct understanding of terminology, content, purpose, and application of open educational resources is being actively discussed in the scientific and expert community. We deem it necessary to clarify these matters to be able to gradually approach the goal of the research.

As the previous studies demonstrated, many academics have only a vague understanding of the details of what constitutes open educational resources. Others will confuse "open" with "free" and assume all free resources are open educational resource. Still others confuse "open resources" with "open source" and assume open educational resources refer only to open-source software. Because of these differing levels of understanding, the phrasing of the awareness question needs to be specific (Elaine Allen I., Seaman J., 2014).

It is important to consider that open educational resource include forms of education offered in digital form (full courses, units, video lectures, software, training materials, method guides etc.), rather than standard forms of education. We completely agree with quite a logical question: can OER be many types of resources, the question often asked is: what is the difference between "stuff on the web" and open educational resource (Thomas, 2010).

And another important aspect to consider is that open educational resource is not any resource but the one used as an educational aid in a specific learning scheme (Atkins D. E., Brown J. S., & Hammond A. L. 2007).

Therefore, an open educational resource should have at least two of the following properties: 1) education is provided to end user in a digital form; 2) open educational resource is used only to give education to end users.

It should be noted that scientists have conducted relevant surveys on open educational resources usage status, confirmed by the results of survey performed by one of European universities. For instance, colleagues from Spain have researched the use of open educational resources by universities. This study concludes that, in general, educational resources in Spanish universities are of heterogeneous type and limited openness. They tend to be published in a duplicated manner in platforms that are not interconnected, and although the total volume has increased when compared to the past, there still exists the need for greater institutional promotion and incentives for authors. Furthermore, it is important to note that the creation of educational resources in Spanish universities relates more to teaching innovation and to the use of ICT in teaching than to open publishing. This explains the rare mention of these resources in open access policies (Santos-Hermosa G., Estupinyà E., Nonó-Rius B., Paris-Folch L. & Prats-Prat J., 2021).

When forensic science education materials are provided as open educational resource, the end users of such content may be experts, scientists, students, practitioners etc. And it is only logical to consider the content and accessibility of such open educational resource.

There are views that forensic science in general finds itself under crisis (Sikorski, M., 2022). And one of the reason is limited education or "education with borders". Open educational resources can be useful to facilitate access to specific data and knowledges.

The training and education of forensic experts has certain peculiarities. Fast digitalization process, new digital infrastructure, as well as open scientific data and availability of such data present several challenges. For both countries - Latvia and Ukraine – the OER system

is an innovative approach that evolves alongside with the science. In such a specific field as forensic science, OER provides a flexible learning environment, thus specific conditions must be met. Special scientific environment must be created for education purposes. New technologically based skills among professionals and students in the field of criminalistics shall be developed. (Palkova K., Agapova O., & Zīle A., 2021).

It is reasonable to highlight that expert training must meet contemporary requirements and consider the experience of using new educational technologies as a source of vast opportunities for the development of justice expert support. However, to be able to use the benefits of these opportunities, tutors, scientists and future experts should reach a new level of literacy. The major objective of tertiary education and expert institutions is to rapidly adapt to these conditions and to offer educational content able to satisfy the needs of both Ukrainian and European labour markets (Kliuiev O., Agapova O., Palkova K., 2020).

As part of implementation of 'open educational resource: forensic science' project, a unique survey has been held to collect information on OER usage in justice expert support among experts from EU, Southern Caucasian countries and Central Asia. Relevant invitation letters to online survey (by filling in a Google Form created for the purpose) have been prepared and sent. Structured, closed-end interviews were used (Marín V.I., Zawacki-Richter O., Aydin C.H. *et al., 2022).* The interview questions consisted of answers "yes" or "no" to each question, but several multiple-choice questions were added as well. The limits of survey – participants who represents forensic institutions or forensic experts. The importance of question wording was evident to study the expert community awareness of open educational resources (Toru Iiyoshi, Vijay Kumar M. S., Brown J. S., 2008)

132 representatives of expert institutions from Bosnia-Herzegovina, Bulgaria, Czech Republic, Georgia, Germany, Greece, Israel, Latvia, Montenegro, Poland, Slovenia, Ukraine and other countries have participated in the survey.

The questions expert community representatives were asked concerned the practice of using open educational resources in the training of forensic expert institution workers, in educational institutions which train expert personnel with the allowance of national peculiarities etc.

Main survey results are schematically shown in the following Figures. The survey shows that more that 94% of respondents stated that the expert institutions implement the training of forensic experts. It means that the issue of training programmes of forensic experts delivers courses. But the question is about the format of particular courses. There are several options to improve the educational level of forensic experts, and one of such is online courses, as well as courses via online instructor, or using a blended learning approach in which students complete preparatory work online before attending classroom- and scenario-based instruction. This approach probably cannot be used in all preferable situations, but definitely can provide the same level of fundamental knowledge skills as in-class lecturers.

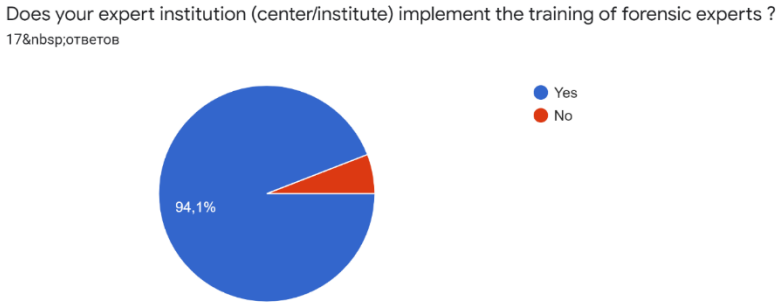

Figure 1: Training of forensic experts.

Next question that plays important role in open educational resource system is the level at which such approach can be implemented. According to the questionary results, expert training process takes place in specific institutions such as expert institutions, centres or institutes. Higher education institutions are not sufficiently involved in expert educational process as specialized institutions. Nevertheless, it must be noted, that research of educational programmes at university level showed that introduction of elements of forensics in the relevant study courses is provided broadly (Vilks A., Kipāne A., 2021). Whereas, the impact of private organization in the field of forensic experts training is even lower that impact of higher education institutions.

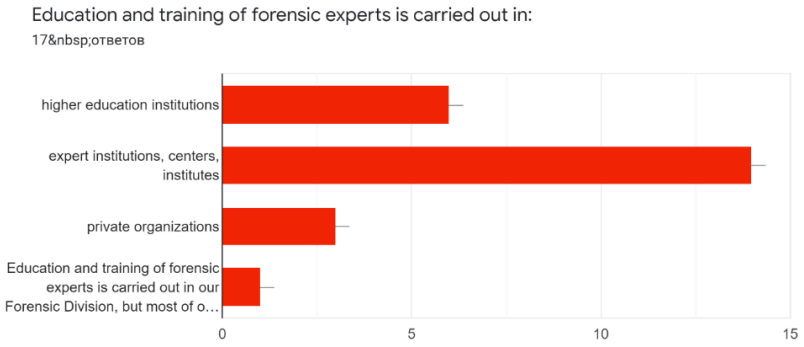

Figure 2: Education and training of forensic experts

As mentioned above, the private sector is not yet playing the main role in the field of forensic experts' education, bet from the open educational resource perspective, the private sector is more proactive to develop new forms of educational models. Several examples of private sector initiative in forensic as science developing from the open educational resource perspective must be noted. For instance, DNA Analyst Training Program, that offers online DNA analyst course to prepare laboratory team for casework. This programme originally was used for students. The aim was to give to the students access to the most current, consistent knowledge base to get them advanced quickly. It

has to be noted that forensic expertise in DNA field has great potential. DNA present in most of the cells in our body, dealing with the unique information of our body. This has become an advantage for forensic investigators who draw conclusion in identification of victim and accused in crime scenes. There, the genetic expertise related information from the educational perspective is valuable for young experts (Lakshmi Jaya B., Tejasvi M. L., Avinash et.el., 2021).

Next example is the programme that gives some introduction to digital forensics, methodologies, key technical concepts, and tools to perform examinations and media exploitation. This programme is used in open educational resource platforms as general information source for young experts.

The questionary also shows that in general the forensic experts are satisfied with the level of education. And the question is about the necessity to develop open educational resources among the experts and institutions.

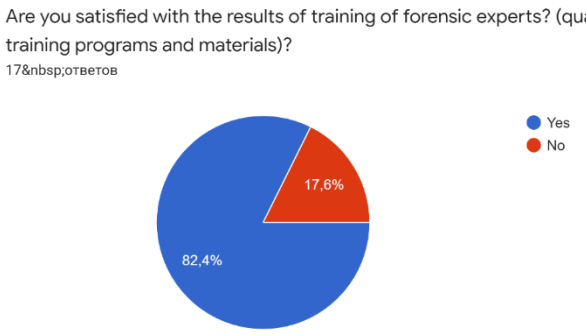

Figure 3: Satisfaction with the results of training of forensic experts.

It must be noted that according to the questionary more than 35 % of respondents state that they do not know what Open Educational resource means.

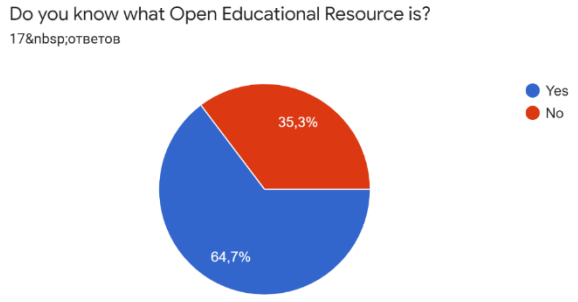

Figure 4: Information about the Open Educational Resource

Besides, more than 67% of respondents stated that they do not have any open educational resource in the field of forensic sciences and criminalistics. It means that experts are mostly educated in institutions, at universities and they are limited to developing in very narrow

national forensic experts' field because of lack of professional focus on broadening access to information through the use of free, open content in their specific fields.

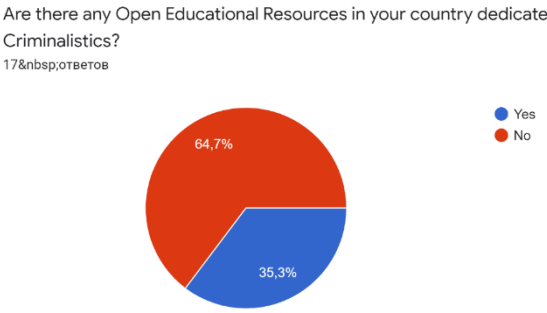

Figure 5: Open Educational Resources at national level

What we did found out through our research is that the experts are ready to share their unique knowledge, research and practical material by publishing it in open educational resources. The sharing of that knowledge has a huge impact on forensic science development at national and international level. More than 76% of respondents agreed to share their knowledge. Forensic experts at individual or institutional level could make open educational resource videos on issues of sustainable development of forensic science, digitally share practical materials to improve and develop open knowledge policy (Chiu, Mei-Shiu, 2021). Nevertheless, 23,5% of respondents are not ready to share their materials. The reason can be related to the specific issues or restrictions, sometimes due to the security aspects.

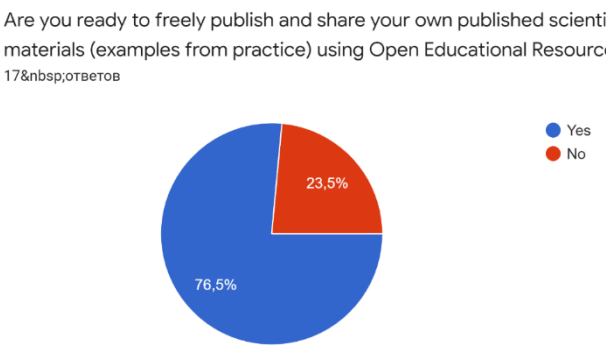

Figure 6: Sharing of knowledge using Open Educational Resources

In general, the statistical processing and analysis of survey results allow drawing the following conclusions:

1. In the vast majority expert training is performed at expert institutions and less often in tertiary education facilities.
2. 82,4% of respondents are satisfied with the level of expert personnel training in the

relevant institutions.
3. 100% of respondents use subject-related resources on forensic expertise and science.
4. 64,7% of respondents are aware of existence of Open educational resources.
5. 64,7% of respondents report that forensic expertise and science OER's are not used in their countries.
6. 76,5 % of respondents are ready to use open educational resource to freely place and share their published articles, practical data and other materials.
We have grounds to specify that before introducing new educational models in expert personnel training, the use of surveys for collecting information allows to get data on expert community awareness of open educational resource and on the possibility of their further introduction in justice expert support area.
The efficiency of open educational resource introduction in the curricula of Ukrainian and Latvian tertiary education institutions and in expert training facilities still requires further research.
To enable staged introduction of technology in expert personnel training, participants of the 'OER: Forensic Science' project have prepared videos of experts working in laboratories of the State Forensic Science Bureau of Latvia; these videos are available at the RSU official website.
The survey held among expert community is unique as no such research has been performed in Europe before. The survey results reflect the clear position of expert institution representatives on the viability of using open educational resources as a curriculum element in expert training at universities and expert institutions.

4. Conclusion and Implications

This study contributed to the literature by providing particularly new approach into the system of the forensic institutions and educational institution that influence Open Educational resources in the forensic science field. This study highlines the importance of several perceptions that have been identified in the literature. Besides, the study also offers a framework that helps to assume necessary elements that were identified in the project.
The area of justice expert's support has a significant potential for the introduction of new forms and methods in personnel training. Study and task-oriented activities of scientists and support from expert community in this area will allow taking consistent and packaged measures to introduce open educational resources at the stage of personnel training at universities and expert institutions.
Based on survey results we can say that the international experience of using open educational resources in forensic science undoubtedly requires further steps, from scientific research to identification and development of the most efficient scheme of introducing new educational models.
Considering the scale of personnel training for expert institutions and the social demand for skilled experts, we deem it reasonable to pose several conclusive points.
1. Adapt the notion of 'open educational resource' and develop a single approach to understanding, preferably at the legislative levels in Ukraine and Latvia. National regulation shell be provided to develop and protect this kind of educational research on expert educational level.

2. Extend cooperation with ENFSI (European Forensic Science Institutes) as one of the leading expert institutions in the EU for the development of joint recommendations on viability of using open educational resources in expert institutions. COST action as possible solution could be instrument to develop multinational resource.
3. Promote the use of 'Open educational resource: Forensic Science' among universities which train personnel for expert institutions. Such kind of promotion could be possible working on educational study programme/study course level on programme accreditation level.
4. To develop a unified framework for the publication of theoretical comparative information on forensic science issues in cooperation with national forensic experts or institutions.
5. To develop the present assessment of 'Open educational resource: Forensic Science' as of process at international level that aims to "translate" forensic science current theoretical and practical issues into practical principles and actions that forensic institutions, experts or students should apply in daily practice. We advise initiating new approach to forensic science organizations by self-development of the experts and proactive approach to improvement of expert experience using open educational resources.

5. Acknowledgement

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