spatial and temporal dimensions, labour market may manifest itself quite differently and more - lose its traditional features (e.g. the labour market of mono-specialized cities; for them, labour market does not meet all the features, and in case of branch crisis, it actually loses its functionality).

Modern problems and peculiarities of Ukraine labour market reflect deep internal contradictions and features being peculiar to national economics, employment sphere due to the incomplete nature of the structural reconstruction of economics, political shocks, the poor control of social-economic policy in the labour scope, the distortion of social values, the weak mechanisms of state regulation, inadequate marketing techniques.

epistemological analysis, labor market, employment, unemployment, shadow labor market

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The Influence of Open Source on the Quality of Education

Aim of this article is to analyse the impact of Open Source on the quality of education. The article discusses main trends in development of Open Source, its application, benefits and drawbacks of exploiting the approach with regards to education, and the potent of Open Source to change the traditional tertiary education. Openness contributes to emergence of a more available and competitive higher education system, with the ability to improve access to learning materials and their development in conformity with regional particularities. Development of Open Education has initiated a significant global shift in the area which complements and diversifies the forms and methods of learning.
open source, education, open education, massive open online courses, open educational resources, quality of education

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Вплив ресурсів відкритого доступу (Open Source) на якість освіти

Мета статті полягає в аналізі впливу ресурсів відкритого доступу (Open Source) на якість освіти. У статті розглядаються основні тенденції розвитку відкритих ресурсів та їх застосування в галузі освіти, переваги їх використання та як вони змінюють традиційні освітні процеси. Відкритість сприяє формуванню більш доступної та конкурентної системи вищої освіти, з потенціалом для поліпшення доступу до освіти, її розвитку відповідно до регіональних особливостей. Розвиток відкритої освіти ініціював значні глобальні зміни у системі освіти, які доповнюють і диверсифікують форми і методи навчання.
ресурси відкритого доступу, освіта, відкрита освіта, масові відкриті онлайн-курси, освітні ресурси відкритого доступу, якість освіти

Statement of the problem. During the past years, the Open Source movement has gained momentum and its influence on economic growth, innovation and competitiveness among businesses in all sectors has increased. Companies are determined to think out of the box and adopt strategies based on collaboration, open methodologies and peer production to keep up with the competitive environment and with the fast pace at which the industries they operate in are evolving. This movement is based on a large number of volunteers who choose to contribute to open source projects for a variety of reasons, ranging from doing social good to enhancing their skills or networking. The impact of open source is especially emphasized by the collaborative strategy adopted by different businesses, by the boost it has given to entrepreneurship and by the cost-related advantages [18].

The education sector, the most impacted sector by the Open Source movement, has been transformed by digitization through virtual universities, online courses, education portals and courseware [8]. Open solutions are widely used by colleges and universities not only because of how cost-effective these solutions are, but due to many other aspects which will be more thoroughly discussed in the following sections of this paper.

Analysis of recent researches and publications. The Open Source is multifaceted phenomenon related to wide variety of domains including policy and governance, industry, culture and education. It is broadly described in research literature as a community practice (for instance by Edvards [4] and Tuomi [20]); a social system with specific values (Lessig [10]); a scene and a hybrid model of innovation by Lin [11]; and analysed as a new economic model in works of Khalak [7], Lerner and Tirole [9]. The growing influence of Open Source resources, software and approaches on the educational field, operation of colleges and universities were discussed, among others, by Caswell, et. al. [3], Vest [21] and Wiley [26]. But this issues are considered fragmentary and there are no sufficient studies devoted to the assessment of the influence of Open Source on the quality, efficiency, effectiveness etc of different levels of education.

Statement of the objective. In this paper, authors aim to analyse the impact of Open Source on education by looking at the main initiatives of the movement, what motivates its adherents, the strengths of the new approaches and how they change the traditional education processes.

The main material. During the past years, the Open Source movement has gained more influence in the education sector. Some of the advantages which have driven educational institutions to opt for Open Source are:

- the absence of a license fee in the case of software with open code, as instead of investing a large sum of money in products from software companies, universities and schools opt for Open Source licenses which are free;

- flexibility, products offering under the open licenses may be customized and imported from the Open Source community;

- service continuity, as the Open Source communities offer help through support systems;

- continuous improvement through constant collaboration between programmers, volunteers and users;

- tax benefits as governments try to encourage the implementation of Open Source projects [19].

For a better understanding of the influence of Open Source in this industry, authors analysed the dimensions impacted by the phenomenon in education and tried to merge the results into a modern definition which will lead to a more organized and concise analysis.

The three dimensions influenced by Open Source are educational resources, represented by freely available educational materials and media, technology – software in the broad sense, and educational practices, represented by techniques used to support teaching practices, portals, materials used in educational institutions. By influencing positively all three dimensions mentioned, the Open Source movement leads to improved educational access and effectiveness. Open Source instils the principle of sharing and of building on existing knowledge, as sharing has proven to be beneficial to human progress.

The education sector has been influenced substantially by the use of Open Source. Barriers as access to education have been broken down by universities who decided to publish their courses online so that the global teaching community can benefit through mutual collaboration [23]. The learning process has become more flexible and customizable, paving the way to quality educational systems which focus on the most important stakeholders, the students.

As previously mentioned, the Open Source movement led to the digitization of education and to the transfer of some teaching materials online. In this way, quality education is available for students worldwide through the virtual world. Online courses and courseware are probably the most well-known resources which appeared as a result of the Open Source movement. These courses are offered both by renowned universities, for example the online learning system edX founded by MIT and Harvard University in 2012 [16], or by organizations which have gathered study material from academic sources. Coursera, with a community of over 10 million students from every country of the world, is an example of a platform created as a partnership between universities and organizations which offers free online courses with the aim of providing universal access to the world's best education [1]. Some other examples of platforms offering online courses and courseware are: Open Yale Courses, FreeEdNet, Online Education Database, Webcasts at UC Berkeley, Open Culture, GCFLearnFree, MIT OpenCourseWare, OpenCourseWare Consortium, Advance Learning Interactive Systems Online (ALISON), etc.

Project Gutenberg, a volunteer effort to digitize, archive and distribute cultural works, founded in 1971 by Michael Hart, Professor of Electronic Text at Benedictine University, is the oldest digital library. In 2015, Project Gutenberg counted a collection of 50 000 items [15].

By providing free literature through online libraries, the freedom of thought and expression is fostered. Furthermore, the availability of books online leads to the growth of literacy. Other examples of online libraries are Eldritch Press, Bartleby.com, Great Books Online, Baen Free Library, The Public Library of Science (PLoS) [17, p. 37-38].

Another Open Source approach which constitutes as a benefit educational resource to users is represented by non-profit community labs. This means offering access to equipment which is otherwise found only in universities and other inaccessible professional labs. Therefore, people can become part of communities formed by different types of scientists. This encourages the sharing of knowledge and ideas, enriching the learning process. One example of a community lab is BioCurious, located in California's Bay Area, which first started as an online community to extend later into a biotech hackerspace and community lab. Anyone can become a member and use the professional equipment, meet other biology enthusiasts, exchange ideas and learn from the other scientists [13].

The Open Source movement leads to the emergence of a phenomenon which people call "Open Education" (OE), which evolves in the complex system of numerous elements, their interdependencies and interactions, a new philosophy about the way people should produce, share, and build on knowledge.

The potential of OE leads to a full redefinition of the teaching and learning environment. By providing new technologies and inventions, Open Education can contribute to solving the educational challenges related to learning in the XXI century. Among others, it helps to foster teachers' professional development, overcome lack of financing, continually improve the quality of educational resources, widen the distribution of high-quality learning materials, and break down the barriers to obtaining up-to-date and quality knowledge.

As it was mentioned earlier, Open Education has three pillars that define forms and properties of elements and entities of the system. One is the scope of policies and techniques connecting various components, such as educational resources, software frameworks, matters of strategic management, licensing issues and approaches to credential granting and funding models, new opportunities to better skills and facilities for the creation, dissemination and management of knowledge.

The second pillar is represented by technologies that include technical solutions for creation, retrieving, updating, delivering, sharing, storing and reusing educational resources, which constitute the third part of the framework.

From the other side, Open Educational Resources themselves are important phenomenon, which became the starting point for the development of Open Education. They established a basis under which different OE technologies arise. The combination of educational resources and technological methods led to the emergence of complex entities such as OpenCourseWare or Massive Online Open Courses. The necessity to deliver them to students in an efficient, appropriate and sustainable manner provokes the emergence of unique techniques and common practices.
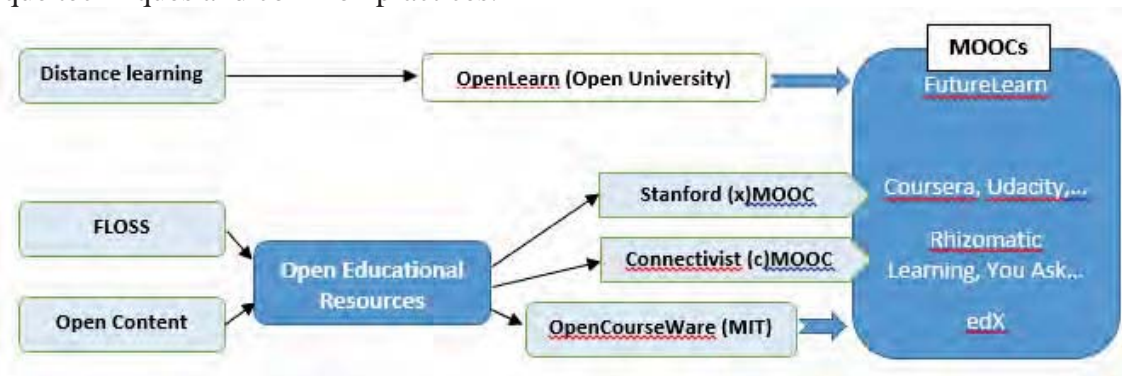

Figure 1 – Evolution and genealogy of Open Education system elements

Source: compiled by the authors.

The Open Education system in many aspects is self-sustaining and expanding. For its growth, OE stimulates derivation of new more viable entities and cooperation schemes. Not all of them are absolutely "open". Even the word "open" does not always mean the same: it may mean free of charge for students to take part or for faculties to use free materials in teaching, and can also refer to the fact that students attend courses without having to meet specific entry requirements. Despite this variety of forms, all those programs can be combined in several trends which have many common features and represent several major groups (Figure 1) [23].

Participants defined Open Educational Resources (OER) as "the open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for non-commercial purposes" [24].

Several other OER definitions, which highlighted different (sometimes controversial) features, were published since then. The most recent understanding is proposed by OECD. It defines Open educational resources as "teaching, learning and research materials that make use of tools such as open licensing to permit their free reuse, continuous improvement and repurposing by others for educational purposes".

The definition is very broad, but it is refined by highlighting the OER key features:

– they can be any type of learning resources used in an educational setting;

– they are often, though not exclusively, offered in a digital format (which allows easy reuse, sharing, adaptation and repurposing of the resource);

– they provide the possibility of taking original work from other providers and being able to adapt, change and repurpose it to produce a new resource, for a different educational setting than the original one [14].

The MOOCs represent a logical evolution step in the OER development. They are an innovative form of distance learning which can be described as the delivery of free online courses without entry requirements and limits to participation, and which does not lead to formal credit or degree recognition. A MOOC is an online course with the option of free and open registration, a publicly shared curriculum, and open-ended outcomes [12].

MOOCs can be considered as more advanced versions of OER sharing systems such as OpenLearn and OCW. The main distinction is that, basically, MOOCs can be described as a *mechanism* for creation, testing and distribution of unified OERs. They are tools for mass production of knowledge. They inherit most of the effective features from antecedents but introduced new techniques.

In the course of development MOOCs split by the extent to which they emphasize traditional learning approaches. A new sophisticated teaching philosophy of what it means to know and to learn, inspired by Downes, Siemens, Cormier, Groom et al, was called "connectivist MOOCs" (cMOOCs). The more recent and formal are Stanford xMOOCs, which include Udacity, MITx, EdX, Coursera and Udemy [6]. The teaching methods and practices of these branches are quite distinct:

– cMOOCs are sustained by "connectivism" and learning through interaction on social networks;

– xMOOCs "are so far based on a very old and outdated behaviorist pedagogy, relying primarily on information transmission" and knowledge duplication [2].

MOOCs include a series of characteristics that challenge prevailing models of higher education provision: they are open, easily scalable, inclusive, and favor interactivity and customization. These features can be seen promoting cost savings and supporting the personalization of learning experiences. They impact on the capacity of institutions to integrate these resources into new business models. From the other side this process leads to the blurring of "openness" and emerging of MOOCs and other types of e-learning that are not "open", but are based on participating in a specific, institution-based, program.

Stated above leads to the fact that MOOCs gain significant power and in 2015 OECD recognized MOOC as a form of cross-border higher education which promotes new delivery modes and cross-border providers [22].

The role of higher education as a major driver of economic development is well established, and will become even more obvious as further changes in technology, globalization, and demographics intensify. To remain competitive in light of these alterations, regions will need to improve productivity and adopt an innovative spirit. Higher education has the capacity, knowledge, and research necessary to help achieve these goals.

As authors show above, Open Source has deeply penetrated into the educational sphere. This process holds for decades and leads to substantial shifts in teaching practices, ways of delivery of information, learning content, etc. Notably significant changes are in tertiary education where the Open Source movement tends to initiate disruptive turns which will definitely shake conservative and sluggish systems.

Being aware of these changes, governments and global organizations pay more and more attention to the process in order to support the competitiveness of educational institutions and keep them modern and efficient. They define quality management as an important aspect of sustainable educational development. Higher education is a service which is social by its nature and it is not possible to separate the output from the production process. This means that quality assessment in education can highlight as drawbacks of "final product" inefficiencies and gaps in the learning process. But the complexity of the educational system and the diversity of its elements cause great difficulties in defining the accurate indicators which show the exact status of this or that part.

As considering that the impact of Open Source is very complex and multi-faceted, it is very hard to assess it authentically in absolute numbers. Besides, as authors want to estimate changes, it will be more beneficial to make comparative analysis of the influence of outcomes.

To achieve the stated above authors chose the Report of the European Commission on improving the quality of teaching and learning in Europe's higher education institutions (June

2013) [5] as a basis for our analysis. In this document a group of experts, after the assessment of the European higher education quality, provides recommendation on its improvement. Many of these recommendations concern the fields impacted by Open Source and give an opportunity to estimate this influence. To reach this the questions from Chapter 6 "Checklist: lead questions for quality teaching and learning" were used.

The first part of the questionnaire contains questions addressed to administration personnel of educational institutions and concerns basically conditions and opportunities for teaching and learning processes.

The first set of questions in this part is: "What strategies or benchmarks do I use for enhancing the quality of teaching in my institution? How do I incorporate these into my institution's profile and mission, to make it clear to staff and students that my institution is affirming the importance of teaching and developing its quality?".

The new technologies which Open Education brings to teaching provide institutions with outstanding competitive advantages. They give a wide range of opportunities to increase study process effectiveness and quality. This influence is obvious and the main task for the leader is to recognize and implement such technologies.

The questionnaire has two sets of questions which refer to support and professional development of the teaching staff. One of them is addressed to administrative bodies and the other is proposed for self-assessment of educators. The questions asked in these parts concern:

− teaching skills assessment, development and making the most of new modes of teaching and learning;

− ways and motivation for enriching teaching/learning experience at institutional, departmental and personal levels;

− the place or person to whom a teacher can address issues related to developing or improving his/her teaching skills, methods and outcomes and personal interest in such an opportunity;

− the support and motivation of teachers' efforts to cater for diversifying student needs, by offering flexible learning paths and speeds.

To be a good educator in a permanently changing environment, a person needs opportunities to improve his/her qualification and learn new educational approaches, practices and technologies. Under conditions of shrinking financing and poor funding even big universities don't have so many opportunities to provide its personnel with new proprietary technologies or develop their own.

But any teacher can participate in the open source development of such technologies or simply use openly shared results. According to Sailor survey report which explores the user experience of teachers that participate in Sailor.org Academy courses, 56,21% of respondents agreed that they use a broader range of teaching and learning methods, 60,37% stated that they have a more up-to-date knowledge of their subject area, 53,23% agreed that they reflect more on the way they teach, 38,81% more frequently compared their own teaching with others, 44,19% studied Sailor.org content to develop their teaching and 35,85% collaborated more with colleagues. Another survey made by Hewlett-funded OER Research Hub showed that 46.5% of educators agree or strongly agree that OER broadens the range of teaching and learning methods they use. The rate of negative answers for all questions is less than 15%.

This part of educational process has great benefits deriving from the usage of Open Source. Rich course content, various media, variety of information are used in MOOCs. To improve their classes, educators have to be sure that the course design encourages and requires the active involvement of students in the learning process, which is organized in a way that it will not simply provide students with facts and knowledge, but confront them with questions that are bigger than the course itself.

Surveys' statistics here show that 50% of learners engaged in Open Education use more multimedia, 52,5% increased their experimentations with new ways of learning (Farrow, 2013), 66% of student increased interest in the subjects taught and 63,8% of them increased satisfaction with the learning experience. The rate of negative answers for all questions is less than 15% [5].

This set of quality assessment questions is closely related to ICT and Open Education. Modern technologies make it possible to use similar rich content in classrooms and for e-learning. Both sides have their benefits. Educators have the opportunity to express their knowledge in a better way and with less effort, while students receive broader experience in the field of the course. New technologies help to solve the problem of the student body growing heterogeneity by using different methods, new media, new modes of delivery. They help teachers to provide a research-rich and interdisciplinary environment to students, to give them a sense of global connectedness and an understanding of how their subject is viewed in different parts of the world.

A majority of educators perceive the impact of OER on student learning as increased interest in the subject taught, increased satisfaction, independence and self-reliance. Another substantiation of the positive influence of the Open Education on the knowledge availability is the number of students who are enrolled for MOOCs. One class can include hundreds of thousands of students. Millions of them participate in courses all over the Internet.

Conclusions and prospects for further researches. The past decade has shown the development of a global movement of concerned educators and scientists who aim to open up access to the knowledge for everybody. Inspired by parallel developments in the open source software world, this Open Education movement seeks to provide free access to quality teaching materials that can be easily distributed, customized and personalized to match different needs. Besides, it encourages scientists and educators to link within a global knowledge community that can benefit and efficiently propagate educational content.

Despite the diversity of orientations and affordances across the programs, one common and critical issue that all open educational programs face at the present time is the challenge of planning for and ensuring their respective sustainability, which is defined here as the long-term viability and stability of the open education program. But still, Open Education initiated a significant shift in the global educational system. OERs augment classical ways of learning, enrich teachers' arsenal but threaten the existence of the pre-emptive majority of institutions that will not manage to adapt in the new reality.

It is still a matter of discussion whether Open Source revolution in education is good or evil. There is no clear way of cooperation or rivalry between classical and e-learning. But it is incontestable that those disruptive changes will modify the system.

To summarize the findings, authors can say that whenever Open Education techniques and Open Education Resources are used within the old-fashion class or as a MOOC course they enrich the student's experience and give opportunities to teachers to expand their professional skills in order to increase the quality of their work. Adoption of the open license models to educational and academic activities leads to more liberal and wide dissemination of knowledge, teaching practice exchange and improvement and the total availability of high-quality education especially in developing countries.

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Влияние ресурсов открытого доступа (Open Source) на качество образования

В современном мире развитие ресурсов открытого доступа (Open Source) достигло небывалых масштабов, что вызвало особую заинтересованность педагогов и ученых, которые стремятся открыть доступ к знаниям для всех. Целью данной публикации является анализ влияния ресурсов открытого доступа (Open Source) на образование с учетом главных инициатив движения, мотивирующих своих приверженцев, новых подходов и того, как они меняют традиционные образовательные процессы.

Использование возможностей открытых ресурсов в образовании обеспечивает свободный доступ к качественным учебно-методических материалам, которые могут быть легко распространены и персонализированы, чтобы соответствовать различным требованиям. Кроме того, оно призывает ученых и преподавателей, активно принимать участие в рамках глобального сообщества знаний, что может оказать положительное влияние на образовательный контент, расширяя его. Развитие открытого образования инициировало значительный сдвиг в мировой системе образования. Образовательные ресурсы открытого доступа (OER) дополняют и диверсифицируют формы и методы обучения. Открытость способствует формированию более доступной и конкурентной системы высшего образования, с потенциалом для улучшения доступа к образованию, развитию в соответствии с региональными особенностями, а также повысить интеграцию образования в повседневную жизнь как часть непрерывного обучения.

Обосновано, что использование образовательных ресурсов открытого доступа (OER) в сфере образования и научной деятельности, приводит к более либеральному и широкому распространению знаний, а также к совершенствованию и общедоступности высококачественного образования, особенно в развивающихся странах.

открытые ресурсы, образование, открытое образование, массовые открытые онлайн-курсы, образовательные ресурсы открытого доступа, качество образования