COMPUTER ONTOLOGY AS AN INSTUMENTAL PLATFORM TO ENSURE TRANSPARENCY OF THE EUROPEAN AND NATIONAL QUALIFICATIONS FRAMEWORKS

Priyma S.M.
Melitopol State Pedagogical University named after Bogdan Khmelnitskiy

Annotation. The article analyzed the instrumental platforms of European and national qualifications frameworks. It was found that the European Qualifications Framework contains eight interrelated levels where qualifications determined by training results - triad professional qualities: knowledge, skills and competencies. This approach helps to compare qualifications and simplifies their recognition. The study gives examples of modern instrumentation platforms of the European and national qualifications frameworks to facilitate the establishment of the balance of the qualifications mentioned advantages and disadvantages of each approach. Proved that the qualifications frameworks can successfully functioning based on the ontological approach, the content of which is to present the subject area of knowledge with a help of computer ontologies. Ontology is a description of declarative knowledge in the form of classes with the relation between them. The article highlighted the features editor Protege-OWL for building subject-oriented ontology.
Keywords: knowledge, skills, competencies, qualifications, ontology, OWL.

Introduction.

Ukraine's desire to join the European educational space, balancing of national interests and educational and labor market, improving the quality and effectiveness of training, on the one hand, and globalization, technological, economic and demographic changes, labor mobility – on the other hand, require the development and implementation of national qualifications. Based on the results of the study, the national qualifications will not only transparency in establishing value of diplomas, certificates or certificates of education, but will be a catalyst for the modernization of the education system, expand access to entry qualifications. National Qualifications Framework provides National Qualifications Framework (NQF), which coordinates with the European Qualifications Framework (EQF) and promote greater understanding of the national qualifications framework and implementing the concept of lifelong education.

Year ago, Ukraine adopted the National Qualifications Framework (Cabinet of Ministers of Ukraine Order "On Approval of the National Qualifications Framework", № 1341 from 23.11.2011). However, the Order only talking about the determination of levels of qualifications, and their content, the ratio of European Qualifications Framework, strategy of national qualifications require further elaboration. For today there is no understanding of common vision of instrumental platforms of national qualifications framework that would allow to set the balance of the qualifications framework, providing for international comparison and recognition.

Thus, the rationale instrumental platform to ensure transparency of the European and National Qualifications Frameworks is, in our opinion, relevant and timely scientific challenge.

Conceptual framework and methodological aspects of the implementation of the National Qualifications Framework is being actively discussed by academic community of Ukraine, in particular V. Lugovoi [5], [6] H. Podkovka, [9] Y. Suharnikovym, [10] V. Khomich [Khomich V.F. Forming of key competence of specialists in a structure of National Qualifications Framework. http://zavantag.com/docs/1861/index-15321.html] and others. Domestic scholars analyze the use of experience in creating the European and National Frameworks of qualifications, a description of which contain works of foreign researchers - V. Baydenko [3], A. Muravyova, O.Oleynykova, M.Koulz [7], [Oleynykova O.N., Muravyova A.A. Institutional mechanisms of NQF. - http://www.cvets.ru/NQF/NQF-InstMec.pdf], [8], D. Raff, M. Yang. The purpose of this analysis is the development and implementation of new educational standards as the basis for transforming the curriculum and other components of the system of educational and methodological support of specialists' training, and fundamental renewal of methods and means of diagnosing learning outcomes [1]. However, the study of instrumental platforms of European and National Qualifications Frameworks that facilitate installation ratio of qualifications, ensuring their transparency and international recognition of the periphery of scientific research, and some works do not give a general understanding of the problem. For example, to set the balance of European and National Qualifications Framework helps special mechanism – interactive table posted on the portal Commission on the European Qualifications Frame [http://ec.europa.eu/eqf/compare_en.htm]. These interactive tables allow you to compare the national level with EQF. Significant is the fact that these interactive tables provide access to descriptors, whereby the description of levels of qualifications. It descriptors enable to consider learning outcomes through the prism of categories such as knowledge, skills and competence. However, given the mechanism precluded analyze the level of qualifications, establish the relationship between the educational and professional qualifications. Exactly descriptors enable to consider the results of education through the prism of such categories as knowledge, skills and competence. However, given mechanism precluded to analyze the level of qualifications, to establish the relationship between the educational and professional qualifications.

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Today in the European Union is realizes a project TRACE (TRAnsporentCompetenceinEurope), whose goal is also to ensure transparency between the European Qualifications Framework and the national scope of countries that are in the EU [Lundqvist, K. O., Baker K. D., Williams, S. A. An ontological approach to competency management:. http://www.eife-l.org/publications/proceedings/ilf07/Contribution110.doc.pdf]. Unlike interactive tables of European Commission Portal developed within the project TRACE computer ontologies allow to link educational and professional qualifications, which greatly simplifies the process of establishing the balance of qualifications. However, educational qualifications, which are used in the project TRACE, are based on the curriculum. This approach complicates the process of determining the appropriate qualifications as national educational qualifications based on industry educational standards that must also be submitted in the form of semantic value domain. Computer ontology can become such proposal.

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Aims, tasks, material and methods.

Aim of the paper is to analyse and argue a selection of computer ontologies as instrumental platform of European and National Qualifications Frameworks.

Results.

The European Qualifications Framework is essentially a meta-frame that provides comparison of different national qualifications framework qualifications. It is particularly important in terms of increasing globalization of the labor market and labor mobility, and academic mobility in the integration processes of education, especially in Europe (Bologna and Copenhagen processes).

European qualifications framework contains eight interrelated levels at which qualifications shall be determined by training – triad of professional qualities: knowledge, skills and competencies. This approach helps to compare qualifications and simplifies of their recognition. Imagine that an organization or company in one of the European Union countries, such as Sweden, hesitates in choosing candidate from another country, including France, to a certain position. This is due to the fact that employers do not understand French candidate qualifications. However, once matched with French qualifications framework EQF, the Swedish employers with similar comparisons get detailed information about the qualifications of the applicant.

As rightly noted by researchers Oleinikova O. and A. Muravyova, national qualifications are not designed only to describe the qualifications, but also for modernization of vocational education and training, increase public access to qualifications. The role of national qualifications frameworks in modernization is that professional education must move to educational results. It is necessary to develop cooperation in the workplace, develop professional standards, new technology assessment competencies that form the basis of qualifications and recognize educational results, regardless of whether they have been achieved in the field of formal or informal education. Role of NQF in expanding access to qualification is that due to the frame people can determine their own jurisdiction, without going for this training within compulsory education programs that, among other things, enables the optimization of resources for education and formation of flexible education pathways [Oleinikova O.N., Muravyova A.A. Institutional mechanisms of national qualifications frameworks - http://www.cvets.ru/NQF/NQF-InstMec.pdf].

In its report "Implementation of national qualifications framework. International Context" at the International scientific conference "European integration of higher education in Ukraine in the context of the Bologna Process", held October 25, 2012, Olav Antti said that the 14 EU Member States (AT, BE-vl, CZ, DK, EE, FR, IE, MT, LT, LU, LV, NL, PT, UK) and one candidate country for EU accession (HR) with existing national qualifications framework and June, 11-12, 2012 submitted its national reports of Consultative Group EQF. This 11 EU Member States (BG, DE, EL, ES, IT, KY, NO, PL, RO, SE, SI), one candidate country (IS) are preparing to submit their national reports Consultative Group EQF during 2012 year, 4 Member States (BE-f, FI, HU, SK) and one country candidate (TK) - in 2013 [Aarna O. Implementation of national qualifications framework. International Context. http://www.ihed.org.ua/images/pdf/6_oa_ukr.pdf].

Ukraine also joined the elaboration and implementation of the national qualifications system. As stated in the draft Concept of national qualifications (on 16.10.2012), the formation and development of national qualifications of Ukraine aims to implement policies for lifelong education and is based on common European principles and guidelines for quality assurance in education and vocational training [Project of Concept of national qualifications development (on 16.10.2012): http://www.ihed.org.ua/images/pdf/conseption.pdf].

National Qualifications Framework involves social partners in the processes related to recognition education, development and quality assurance and awarding qualifications. Recognition of educational results is independent of the method of acquisition – both by recognizing formal and informal and spontaneous education.

It should be noted that the priorities of the national qualifications are:

- ensuring of qualifications to labor market needs, development of the economy, society and citizens;

- increasing the participation of social partners in the processes related to the recognition of educational results, development and quality assurance and awarding qualifications;
- establishing of mechanisms for recognition of educational results regardless of their method of acquisition;
- ensuring of flexibility of qualifications including a variety of trajectories (paths) of acquisition and improvement;
- enhancing the competence of employees;
- recognition of the value of qualifications by social partners (social recognition of qualifications);
- ensuring of international comparability / transparency and recognition of qualifications acquired in Ukraine

[Project of Concept of national qualifications development (on 16.10.2012): http://www.ihed.org.ua/images/pdf/conseption.pdf].

- The main element of the national qualifications is the National Qualifications Framework (NQF), including all levels and subsystems of qualifications and relates to the European Qualifications Framework for lifelong education. National Qualifications Framework describes the levels for all subsystems qualifications - qualifications as formal education and professional qualifications. Comparison qualifications of skill levels NQF based on correlation of educational results for a particular type of qualifications describing a qualification NQF. Du as it shown in [Project of Concept of national qualifications development (on 16.10.2012): http://www.ihed.org.ua/images/pdf/conseption.pdf] there are a number of difficulties that prevents the introduction of the National Qualifications Framework in Ukraine:
- existing qualifying characteristics of professional areas and educational standards do not account system of NQF competencies and usually, they can not compare with the national and European qualifications frameworks;
- present structure of industry standards for higher education is overly complicated and regulated, limits the ability of educational institutions to modify training programs according to the needs of the labor market;
- higher education qualifications are not formally compared with the qualifications of the European Higher Education Space (EHES);
- competency standards for a large number of classes and subclasses of professions are not formed, so that there are difficulties with the assignment of professional qualifications;
- lists of areas and specialties of higher education too detailed and does not meet the needs of the labor market.

To solve these problems it is recommended to carry out the following steps:

- to develop specifications of domestic educational qualifications with regard descriptors of the National Qualifications Framework;
- to conduct a formal comparison of domestic educational qualifications from the National Qualifications Framework (by the levels);
- compare the national higher education qualifications framework with qualifications of the European Higher Education Space;
- take measures to implement complex competentive approach in educational standards and curricula, teaching practices and assessment;
- form professional standards taking into account descriptors of National Qualifications Framework and professional qualifications comparison of qualification levels NQF;
- introduce new approaches to develop industry standards for higher education, determining that:

a. industry standards developed by the higher education sectors of education, which list appropriate form in accordance with the International Standard Classification of Education (ISCED);
b. industry standard of higher education is a holistic document, which must include a description of socio-personal, general, and instrumental generally professional competencies and demonstrate methods and criteria for evaluation of educational results;

- recognize the inseparable academic rights and responsibilities of higher education institutions the ability to identify specifically and professional competence (educational results) graduates and create educational and vocational training program.

Solving of outlined above problems is subject to the use of instrumental platform for establishing the balance of qualifications to ensure transparency of European and national qualifications frameworks.

According to researchers [Lundqvist, K. O., Baker K. D., Williams, S. A. An ontological approach to competency management:. http://www.eife-l.org/publications/proceedings/ilf07/Contribution110.doc.pdf.], platform can provide such tools as RCD (Reasable Competency Definition) or SRCM (Simple Reasable Competency Mapping). RCD is compiled as a standard for consistent and structured description of competencies. This standard makes it possible not only to describe the competencies, but also to share information about them among different automated systems. However, the competence described by natural language are not semantic load. There were occasions when two almost identical competence through their possible lack of semantic analysis recognize by system as completely different. An alternative to standard RCD became standard SRCM, which added RCD logical connections. This would enable to improve the level of understanding of the competencies and their identification. However, ensure qualitative

analysis without full semantic content standard SRCM could not. That is why the most appropriate instrument platform for submission of qualifications and descriptions of educational results are seen with computer ontology.

Note that the idea of using ontologies as a computer instrumental platform semantic representation of a particular subject area is not new. The problem of developing ontological model of distance educational course has become the subject of research A.Danchenko [Danchenko A.L. Development of ontological model of representation of distance educational courses. http://semanticfuture.net/index.php]. Application of multiagent ontological approach to the creation of distributed learning systems considered in the study of I.Keleberdy, N.Lyesnoyi, V.Ryepky [4]. Description of the basic concepts and architecture of Semantic Web as a basis for the operation of public education systems carried out in [2]. Problem of ontologies and their use in computer systems considered V. Lapshin [Lapshin V.A. Ontology of computer systems. http://www.rsdn.ru/article/philosophy/what-is-onto.xml.]. Researchers M.Ronketi and Y.Sant proposed strategy of management training programs (Curriculum) based on ontological approach [12]. Application ontological approach to representation of competencies is presented by H.Pakket [11]. The study [13] devoted to building of ontologies in non-formal and informal education.

As can it be seen from the analysis, these works are completed on specific aspects of using ontological approach in educational systems. However, the use of ontologies as a computer instrumental platform framework of qualifications was not the subject of a separate study.

Ontology for T.Hruber, is a description of declarative knowledge in the form of classes of the relation between them. Drawing describe declarative knowledge usually requires extensive work and certain skills. In the notation of this work and its outcome T. Gruber introduced a special term “conceptualization”. Description he called the “specification”. Thus, ontology, according T.Hruber defined as specification of conceptualization [Gruber T.R. The role of common ontology in achieving sharable, reusable knowledge bases:. http://www.cin.ufpe.br/~mtcfa/files/ 10.1.1.35.1743.pdf].

As researchers N.Noy and D.McGinnes believe, ontology – is a formal explicit description of concepts subject area (classes), properties of each concept that has different qualities and attributes of concepts (properties, roles, slots), the restrictions attached to the property (facet). Ontology form together with a set of individual instances of classes the knowledge base [Noy N., McGuinness D. Ontology Development 101: A Guide to Creating Your First Ontology. Stanford Knowledge Systems Laboratory Technical Report KSL - 01-05 and Stanford Medical Informatics Technical Report SMI - 2001-0880, March 2001:. http://protege.stanford.edu/publications/ontology development/ ontology101.pdf].

Note that the main causes of the development of ontology are:

- the need for analysis of the subject area;
- the need to share human and software agents;
- the need to reuse of knowledge in the subject field.

Often, domain ontology is not the purpose on itself. According to researchers N.Noy and D.McGinnes, developing ontology is similar to the definition of a set of data and their structure for other programs. Methods of problem solving domain-independent software agents are used as data ontology and knowledge base, based on these ontologies.

The development of ontologies involves several steps:

- identifying industry and scale of ontology;
- exploring options to reuse existing ontologies;
- establishing of important ontology terms;
- defining classes and class hierarchies;
- clarify the properties of classes - slots;
- defining facet properties;
- creating instances [Noy N., McGuinness D. Ontology Development 101: A Guide to Creating Your First Ontology. Stanford Knowledge Systems Laboratory Technical Report KSL - 01-05 and Stanford Medical Informatics Technical Report SMI - 2001-0880, March 2001:. http://protege.stanford.edu/publications/ontology development/ ontology101.pdf].

Among the most well-known design of ontologies called KIF (KnowledgeInterchangeFormat), DAML+OIL (DARPA AgentMarkupLanguage) and OWL (OntologyWebLanguage). However, as noted by the most researchers for today the most advanced representation ontology language is OWL (WebOntologyLanguage).

Ontology, based on OWL, is a sequence of axioms and facts with the addition of references to other ontologies involved in it.

To create and edit ontologies it is created a number of specialized development environments, editors, parsers and tools combining ontologies, the most effective ones are: KAON [http://kaon.semanticweb.org/], OntoStudio [http://www.ontoprise.de/en/products/ontostudio/], Ontosaurus [http://www.isi.edu/isd/ontosaurus.html], OpenCyc [http://www.opencyc.org/].

Among these tools for building object-oriented ontology highlight editor Protege-OWL [http://protege.stanford.edu/ overview/protege-owl.html] as flexible, independent from platform environment with the

features and benefits that provides a visual, easy-to-use graphical user interface, implements scalable, ie modular building systems within a unified architecture enables building architecture by further developed routines – plug-ins.

Also Protege-OWL lets you describe classes using the new features. Particular language OWL (OntologyWebLanguage) has a large set of operators and is based on a logical model that allows to define the concept as they describe, because of complex concepts in the definitions can be created from simpler. Moreover, the logical model allows the use of reasoning mechanisms (Reasoner), which also allows you to check whether assertions and definitions in the ontology do not contradict each other and whether the definition of certain concepts. This mechanism is supported by the hierarchy of ontology correctness.

By carrying out a description of all classes, properties, constraints, and objects subject area, we obtain a knowledge base that is essential for the functioning of ontological systems capable of operating over information, including comparable qualifications.

Conclusion.

Computing ontology is an effective instrumental platform to ensure transparency of the European and national qualifications frameworks. With the help of developed computer ontologies will be establishing the balance of European and national qualifications frameworks, the process of comparison of qualifications become easier and procedures for their recognition simplified.

It is supposed directly to develop themselves computer ontology of European and national qualifications frameworks.

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Information about the author:

Priyma S.N.: priyma_s@ukr.net; Melitopol State Pedagogical University; Lenina str. 20., Melitopol', Zaporozhia area, 72312, Ukraine.

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