DEVELOPMENT OF STANDARDS IN E-LEARNING

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Abstract: This paper presents the systematic analysis and international standardization overview in the field of e-learning, with development and planning activities, especially ISO/IEC JTC 1 SC 36 "Information Technology in Education ...", and some aspects and examples of standards in Massive online open courses.

Keywords: E-learning, International standardization, OER, MOOC

1. INTRODUCTION

E-learning is being standardized by the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) - ISO / IEC, [1]. Standardization of e-learning is preceded by development and research results from other institutions, such as, for example: AICC, IMS, DCMI, ADL-SCORM, ALIC, IEEE LTSC, ADRIADNE, CEN/ISSS WS-LT, CEN/ISSS CDFS, CEN/ISSS WS on Privacy, W3C etc ... [2]. JTC 1 / SC 36 subcommittee for e-learning functions within the First unified technical committee (JTC1 ISO / IEC). The organizational structure of this subcommittee consists of seven working groups (WG) and the Advisory Group (AG), as a special working group (SWG). In recent years, the OER (Open Educational Resources) and MOOC (Massive Open Online Learning) stand out among the important concepts.

In ISO/IEC international classification and standardization, education and training are classified as general functional disciplines (ICS = 03.180 and 03.100), but E-learning as well as within the multidisciplinary information technologies (ICS = 35). In that way developed and published standards for e-learning were classified by ISO/IEC into two fields, with appropriate subfields:
1) information technologies - ICS = 35 (subfields: 35.020 general on IT and dictionaries, as well as the subfield applications of IT - 35.240, or in more detail, and for the needs of e-learning – 35.240.99),
2) services, company organization, management, quality and administration – ICS = 03 (subfields: 03.180 – *Education*, as well as 03.100 – *organization and management of the company* and on the next level of standardization 03.100.30 – e- learning from the aspects and within the framework of human resource management) [2].

Development of standards in the field of e-learning is presented in this paper, both on the global (ISO) and the local (SRPS) level. A review of developed and withdrawn standards is given for the two levels.

A particular part of the work refers to the open educational resources (OER). According to OER Commons (oercommons.org) "Open Educational Resources are teaching and learning materials that you may freely use and reuse, without charge. OER often have a Creative Commons or GNU license that state specifically how the material may be used, reused, adapted, and shared."

There are a large number of studies dealing with the standardization of e-learning as well as the open educational resources.

The research presented in [3] deals with standards in e-learning. Also, the experiences at the local level in Germany about the development and use of virtual learning environments are presented too as well as the different electronic learning programs in Germany in order to acquire the neccessery qualifications for examinations and assessment [3]

The standardization is presented in [4] in order to enable interoperability among systems for the Learning Management. The paper provides an overview of standards in the field of e-learning, with a special focus on educational design and content package.

The research in [5] also provides an overview of standards in the field of E-learning along with the process of standards development and lifecycle of standard.

In relation to the research shown, similarity lies in the domain of e-learning under which standards are being analyzed. The differences relate to the specificity of the local level, which is Serbia in this case. In addition, a

special part of the paper refers to the open educational resources and potential standardization of the same.

The paper is organized as follows: the second section shows the research methodology, the third section provides the results in the field of comparative analysis of global and local standards. This section also shows the open educational resources and potential standardization of massive open online courses (MOOC). The last, the fiorth section refers to the concluding observations.

2. METHODOLOGY AND RESEARCH FRAMEWORK

The statistical methodology of dynamic analyses and deductive - inductive reasoning methods were used for predicting the future development and innovation of the pragmatic framework.

The objectives of the research relates to the identification and analysis of the current situation relating to the standardization of e-learning at the local and global level. In addition to the operational objectives, strategic objectives of education improving with e-learning are also important.

The purpose of the research is to determine the possibility of application and improvement of created Java software:
- to determine trends in the standardization of e-learning,
- development of national (local) standardization of e-learning,
- convergence of standards to the users with the aim mass application, etc..

The research tasks:
- Data collecting and information about standardized sources relevant to the regulation of the field of E-learning.

Data collecting was done on two levels: global (ISO) and domestic (SRPS), and with the help of its own Java software [12].
- Selection of data refers to the selection of data and standardized sources in the field of e-learning. This was done at the stage of data collection.
- Analysis of data and standardized sources, through a review of developed and withdrawn standards, and the creation of a trend line.

3. RESULTS AND DISCUSSION

Results regarding E-learning standardization

After analyzing of the data taken from the local and global levels, an overview of samples, developed and withdrawn standards is given. That review is shown in the table 1.

Table 1: Quantitative indices (Iq), parallel ISO – SRPS, for ICS1 = 99, 2015/June

I	Sub/ field	Samples		Developed (Iqi)				Withdrawn	
		Iqs		Iqu		Iqp/2015		Iqw	
	ICS	ISO	SRPS	ISO	SRPS	ISO	SRPS	ISO	SRPS
1)	2)	3)	4)	5)	6)	7)	8)	9)	10)
1	**240.99**	**195**	**63**	**45**	**2**	**117**	**55**	**30**	**6**
	∑ 99	195	63	45	2	117	55	30	6

From Table 1 gives the quantitatively different development of standards at the local (SRPS) and global level (ISO). Table 1 shows indexes whose meanings are:
Iqs-Samples
Iqu-Under development
Iqp-Published
Iqw-Withdrawn

In addition to a review shown in the Table 1, Figure 1 a review of standards development at the global level is given:
- through the time period of 2004-2015. (on the abscissa),
- including indices of values of standardized source for E-learning (on the ordinate, Iqv expressed in CHF, where CHF is the currency in Switzerland),
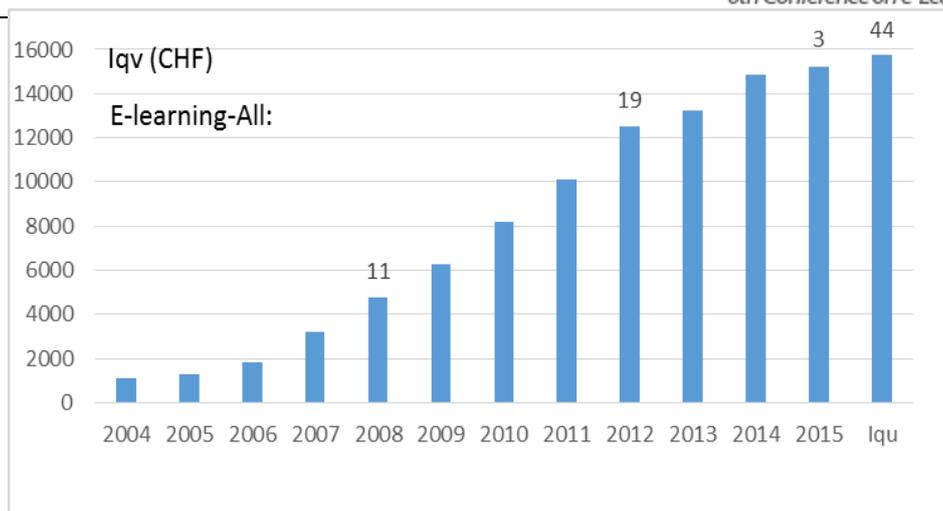- with the hints of published standardized sources (Iqp, for example, $Iqp_{/2012}=19$).

Image 1: Presentation of standardization of knowledge resources for E-learning in the time period of 2004-2015.

Besides the presentation of standards at the global level in selected time period, a comparative overview with the local level was done, along with the creation of a trend line(Image2).
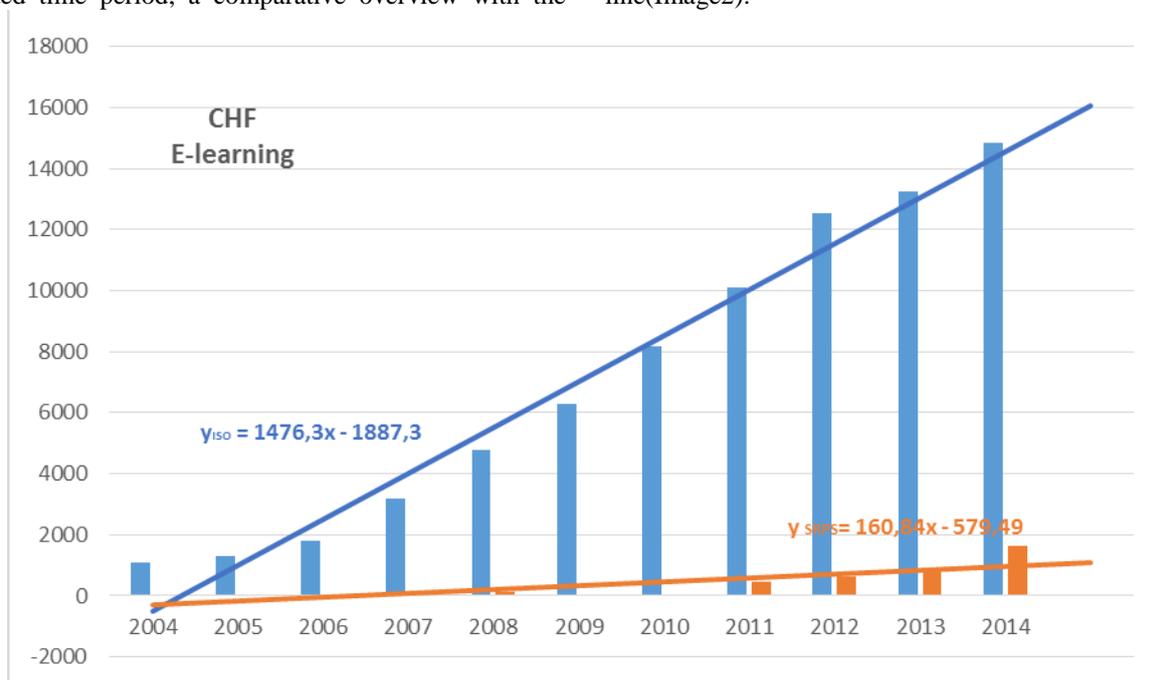

Image 2: Local versus global standardization

Linear lines are selected as trend lines, followed by their equations:

At the global, ISO level: $Iqv/y_{ISO} = 1476{,}3x - 1887{,}3$
At the local, SRPS [13] level: $Iqv/y_{SRPS} = 160{,}84x - 579{,}49$

Besides the results presented, a particular part of the work refers to the standardization of open educational reosurces, hereinafter OER.

Results regarding OER and standardization of MOOC

Open educational resources

The term Open Educational Resources (OER) was first mentioned in 2000 on the Unesco conference. According to OECD (OECD, 2007) resources are not related only on content but on three different categories:

- Learning content- Relates to the content of learning, learning objects, collections and journals;
- Tools- Software that enables the development and distribution of content as well as searching and organization of content;
- Implementation resources- Relate to the intellectual property licenses

The term "Open" in OER refers to a number of aspects, according to [7]:

- Openness in open source
- Openness in the social domain
- Openness in the technical domain

MOOC (Massive Open Online courses)

Massive open online courses (MOOC) have an unbreakable bond with Open educational resources. The term MOOC (Massive Open Online Course) se pojavio during 2008 and it was related to an online course "connectivism and Connected Knowledge", designed by George Siemens and Stephen Downes. According to [8], MOOC integrates the advantages of social networking, a collection of open educational resources and the support of experts in a relevant field. "Massive" refers to the number of the course's participants, as well as the capacities of the course in terms of allowing access to a large number of activities. George Siemens defined "massive" as: "Anything that is large enough that you can get subclusters of selforganized interests. Three hundred plus students could be one benchmark; another could be Robin Dunbar's number of 150 people, which is the maximum after which the group starts to create smaller fractions." [9, page 26]. "Open" usually refers to free access to individual courses, and sometimes it also applies to open or open content platform. "Online" refers to MOOC access via the Internet. "Course" means organizing content in a given time interval, from a subject area, which contains a set of resources with clearly defined goals and outcomes [10]. One of the projects aiming to create OER framework for fostering technology enhanced learning (TEL) within HE institutions and life-long learning within enterprises and WB countries is BAEKTEL project (baektel.eu).

Standardization of MOOC

Potential standardization of MOOC is shown through organizations concerned with standardization.

ISO/IEC JTC1 SC36

The ISO / IEC JTC1 SC36 is the best-known institution dealing with standards in the field of e-learning, and whose data for analysis are used in this paper. In the domain of MOOC standards have not yet been developed, but it was discussed on the 27th General Meeting held in Oslo, Norway in June 2014. At that meeting SC36 proposed a project for learning analysis and big data related with MOOC [11].

UNECE IPQ/CT 187 SC1

In contrast to ISO / IEC JTC1 SC36, UNECE (United Nations Economic Commission for Europe) is engaged in Mocca standardization as well. Image 3 shows the place of MOOC standardization in this organization. IPQ/CT 187 Committee was established in Geneva, on November 20th 2013. IPQ/CT 187 consists of SC1, which covers formal, non-formal and informal education, and SC2. SC1 includes GT3, which is in charge of MOOC & SOOC (Small Open Online Course) MSS standardization.
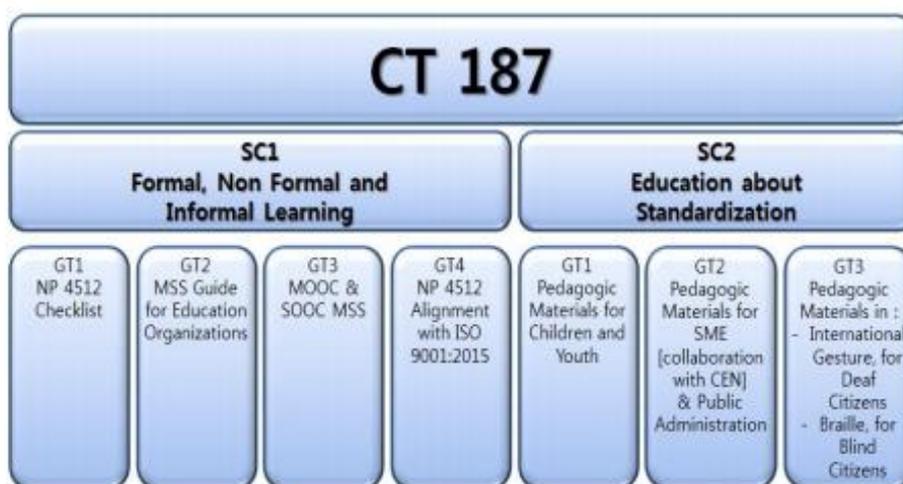

Image 3: IPQ/CT 187 Committee [11]

4. CONCLUSION

Based on the presented results and discussion, conclusions can be given from several aspects:

- about the current situation on the local and global level on standards in the domain of e-learning,
- about possibilities of condition prediction for the future period and planning of improvement.

In addition, the conclusions also refer to the current situation in the field of MOOC standardization, where the

UNECE organization has done the most, as well as the needs for further standardization in this area, keeping in mind the increase in the creation and use of standardized sources.

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