

Globalization of higher education based on military and economic alliances

Globalización de la educación superior basada en alianzas militares y económicas

Konstantin ZAYTSEV ¹; Maxim SERGIEVSKIY

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ABSTRACT:

It is impossible to imagine modern society without changes in politics, economy and social life coming with globalization. According to the chief economist at EBRD Sergei Guriev: "Nothing supertechnological can be created in isolation". In the life of the environments, globalization naturally modernize and coordinates the educational system, which is one of the most important factors of competitiveness and development of modern states, their economic and political associations. That is why it is interesting to study the processes of globalization of education within the framework of the explicit or latent economic and political unions of states, as competent staff becomes the main resource for the development of technology providing excellence in promising fields of science and technology. The impetus for writing this work were the recent events, focusing on the alliances of states. Such as the creation in late 2015 of Pacific Trade Union, which in fact split the Pacific, and put them before a choice of the future corporate strategy development, including education; British exit from the European Union (Brexit); election of the President of the United States, extension and increase of economic sanctions by certain countries against others. The paper discusses some questions about the influence of the membership in alliances on the development of education

RESUMEN:

Es imposible imaginar una sociedad moderna sin cambios en la política, la economía y la vida social que viene con la globalización. Según el economista jefe del BERD Sergei Guriev: "Nada supertechnological se puede crear en el aislamiento". En la vida de los ambientes, la globalización naturalmente moderniza y coordina el sistema educativo, que es uno de los factores más importantes de competitividad y desarrollo de los estados modernos, sus asociaciones económicas y políticas. Es por eso que es interesante estudiar los procesos de globalización de la educación en el marco de las uniones explícitas o latentes de los estados, ya que el personal competente se convierte en el principal recurso para el desarrollo de tecnología que proporciona excelencia en campos prometedores de la ciencia y la tecnología. El ímpetu para escribir este trabajo fueron los acontecimientos recientes, centrándose en las alianzas de los estados. Tales como la creación a finales de 2015 de Pacific Union, que de hecho dividió el Pacífico, y los puso antes de una elección del futuro desarrollo de la estrategia corporativa, incluida la educación; Salida británica de la Unión Europea (Brexit); La elección del Presidente de los Estados Unidos, la extensión y el aumento de las sanciones económicas de algunos países contra otros. El documento discute algunas preguntas

globalization processes.

Keywords: indicators of education globalization, globalization of education systems, modernization of education, economic associations, trade alliances, military alliances, critical technologies, quality of education, student migration.

sobre la influencia de la membresía en las alianzas en el desarrollo de los procesos de globalización de la educación.

Palabras clave: indicadores de la globalización de la educación, globalización de los sistemas educativos, modernización de la educación, asociaciones económicas, alianzas comerciales, alianzas militares, tecnologías críticas, calidad de la educación, migración estudiantil.

1. Introduction

Today it is a usual thing to consider globalization of economy and cultural life of society as a unified, covering all countries process characterized by the involvement of significant human resources, political and economic processes, a substantial tightening of markets, increased competition of goods and services producers forced to struggle for access to limited resources. Specialized institutions (KOF Index of Globalization 2014) and some researchers (Guriev 2016; The United States created the world's largest trade union; Rudenko 2012; Shtatskaya 2009; Ivanovsky 2006; Kehyan 2013; Kozhina & Kosevich 2016), studying globalization, highlighting four aspects of this process: political, economic, social and cultural, noting the existence of a single vector of this process without any significant reasons to fork on this way.

Globalization naturally affects national education systems, forcing them to adapt to economic changes and to stimulate them (Johnson 2012). Now, in the post-industrial world, education is one of the factors for solving large-scale problems of improvement of innovative activity, i.e. increasing the competitiveness of a modern state or alliance of states, as the amount and depth of innovation process largely determines their economic and political weight (National innovation system of the United States: history, political practice, strategy development, 2011).

In this regard, the study of globalization process of education in the world, based on the existing explicit (legally) and latent (not yet legally confirmed) military, economic and trade state alliances, fighting for resources and markets for products and services. It is obvious that some developed states and alliances organized by them, have to keep the technological and trade secrets from potential competitors in global markets. Since the system of education is a significant factor in improving the competitiveness and development of modern states and methods of competent staff finishing training in promising areas of research and development (see Table.1), including critical technologies must be protected by these unions alongside with technological and commercial secrets (Presidential Decree of July 7, 2011 N 899; Korchak, et. al. 2013).

Table. 1. Russia and America priority research fields

No	Russia priority research fields	The corresponding American priority research fields
1.	Security and counter-terrorism	Conventional weapons and energy materials. Visibility control technology
2.	Nanosystems	The materials and processes of their production
3.	Information and telecommunication systems	Information systems technology. Information protection technology
4.	Life Sciences	Biological technology. Biomedical technology
5.	Perspective types of weapons, military and special equipment	Chemical technology. Electronics technology.

		Technologies and processes of military production. Damaging factors weapons. Laser, optical and sensor technology. Marine engineering
6.	Environmental management	
6-1.	Robotic systems of military, special and dual purpose	Positioning technologies, navigation and time tracking. Advanced manufacturing technologies and processes. Self-propelled land management technique
7.	Transport and Space Systems	Aviation technology. Technology space systems
8.	Energy efficiency, energy efficiency, nuclear energy	Technologists energy systems. Technology directed energy systems. Technologies of nuclear systems

Considering the growth of military activity today, we can assume the limiting of education globalization in a wide range of contemporary fields of education within political economic and trade unions (Utkin 2015; Hero Obama and Pacific Trade Union, 2015). No wonder that almost all unclassified publications on critical technologies in the United States has been completely stopped in 2009, and in early 2010 the Internet resource, where were the documents on the subject was closed.

Thus, the globalization of education in the interests of alliances becomes a logical and natural part of the process of globalization (Rudenko 2012). The lack of alternatives of such educational globalization processes within the alliance is obvious, as it allows keeping technological and commercial secrets and evading integration into the educational sphere of the alliance will lead to a backlog of individual countries of the alliance for their technical degradation (Shtatskaya 2009). These arguments lead to the need of educational potential monitoring of separate alliances, although the majority of studies in this sphere focus on global education in the world without restrictions.

The purpose of this article is to analyse the educational potential of individual alliances as a resource to enhance their competitiveness and development in the short term, and a study of expected student migration in the countries of the alliances. To achieve this goal it is necessary to select metrics for the evaluation of educational potential and migration activity and to carry out testing of the proposed approach to the definition of the alliance level of globalization on a real example.

2. Methods

To assess the education globalization taking into account the existing military and economic alliances of states let us select such unions and introduce two metrics to evaluate the current quality of education, and assess expected students' internal and external migration in the alliance.

2.1. Economic, political and trade unions

Let us mention the most prominent unions in different parts of the world: the European Union (EU), the North Atlantic Alliance (NATO), African Union (AU), UNASUR, ASEAN, the Eurasian economic Union (EEU), the Silk road, the Shanghai cooperation organization (SCO), BRICS, the

Pacific trade Union (TTS) and an Informal Association of the countries of the Pacific basin, which are not included for various reasons in TTS (see Table.2).

Table. 2. Economic and political unions.

Name	Year of creation	List of participants	Number of residents
The European Union (EU) and United Kingdom	1993	Austria, Belgium, Bulgaria, Great Britain , Hungary, Germany , Greece, Denmark, Ireland, Spain, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Finland, France , Croatia, Czech Republic, Sweden, Estonia	508 191 116
North Atlantic Alliance (NATO)	1949	Albania, Belgium, Bulgaria, Great Britain , Hungary, Germany , Denmark, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, USA , Turkey, France , Croatia, Czech Republic, Estonia	864 758 823
The African Union (AU)	2002	Algeria, Angola, Benin, Botswana, Burundi, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, the Democratic Republic of the Congo, Djibouti, Egypt, Zambia, Western Sahara,, Zimbabwe, Cape Verde, Cameroon, Kenya, Comoros, Republic of the Congo , Côte d'Ivoire, Lesotho, Liberia, Libya, Mauritania, Mauritius, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Swaziland, Seychelles, Senegal, Somalia, Sudan, Leone, Tanzania, Togo, Tunisia, Uganda, Chad, Equatorial Guinea, Eritrea, Ethiopia, South Africa , South Sudan	929 543 549
Union of South American Nations (UNASUR)	2004	Argentina, Brazil , Paraguay, Uruguay, Bolivia, Colombia, Peru, Ecuador, Chile, Guyana, Suriname	384 381 000
Association of SouthEastAsian Nations (ASEAN)	1967	Indonesia, Malaysia, Singapore , Thailand, the Philippines, Brunei Darussalam, Vietnam, Laos, Myanmar, Cambodia, East Timor	596 000 000
Eurasian Economic Union (EAEU)	2015	Russia , Armenia, Belarus, Kyrgyzstan, Kazakhstan	182 764 394
Shanghai Cooperation Organization (SCO)	2001	China , Russia , Kazakhstan, Tajikistan, Kyrgyzstan, Uzbekistan	1 588 914 914
The Silk road	2015	China , Kazakhstan, Kyrgyzstan, Uzbekistan, Turkmenistan, Tajikistan	1 436 451 720
BRICS	2001	Brazil, Russia , India, China , South Africa	2 850 000 000

Trans-Pacific Partnership (TPP)	2015	USA, Japan , New Zealand, Vietnam, Canada, Australia , Malaysia, Peru, Philippines, Brunei, Singapore, Chile, Mexico	778 897 631
An informal association of countries of the Pacific Basin (AA PB)	2015	China , South Korea, Taiwan, Hong Kong, Philippines, Thailand, Indonesia, Myanmar	1 924 867 188

(Selected countries aspiring for educational poles in a multipolar world are shown in the table).

2.2. Evaluation of the educational potential of unions

To evaluate the educational potential of unions in promising fields of research and development as a metric of current quality of education (the current quality of education - CQE) we will introduce and use the most famous international ratings of ARWU, THE, QS (Academic Ranking of World Universities 2015/16; THE Rankings, Top 200 most international universities in the world 2016; QS World University Rankings® 2015/16). As a metric of expected students' migration (expected student migration - ESM) within the union, we will use the algorithm of relative redistribution of students among countries of the union, depending on the values of their average international rating.

Metric of current quality of education (CQE)

To assess the current quality of union education and its dynamics over the past three years we will introduce and use the metric (CQE), taking into account the sum of scores of universities of the countries members of the union and which are in the first four hundred ranking with coefficients 1.0; 0.9; 0.8 and 0.7 respectively.

Expected student migration metric (ESM)

To assess the expected student migration we will use the metric (ESM), taking into account internal and external migration processes in the unions, including external migration processes caused by out union contracts requiring specialist training.

External to the countries of the union annual migration (E) for the individual country of the union will be the sum

$$E = E_5 + E_{TK}, \text{ where}$$

is a migration for education to five countries leading in the field of international education (USA, UK, Germany, France and Australia),

is a migration caused by a need to train the personnel with the given set of competences (for example, in the field of nuclear energy, operation of complex high-tech equipment in the mining, aerospace and other fields, etc.).

Inna-union migration for individual countries (I_k) of course possible only to the countries with significantly higher ranking of educational institutions, for example in the EU it is still the UK, Germany, France and to countries of the SCO it is China and Russia.

Then the total annual student migration in individual countries of the union in a K-th year can be represented by expression $M_k = E_k + I_k$. On the other hand, approximately 10% of annual growth of migration is taken into account (International migration of students, 2014),

$$M_{k+1} = 1,1 M_k = 1,1 (E_5 + E_{TK} + I_k)(1) \quad (1)$$

Here, the expression $E_{TK}(1)$ is random, heavily dependent on geopolitical situation in the world, has a tendency to gradual decrease, so inner-union migration has to compensate these losses in

the expression (1).

3. Results

Let us make the evaluation using the above metrics. For example, for ARWU ranking, separately for each country, such as Brazil, Russia, India, China, South Africa we have such dynamics of the number of universities ranked in the first four hundreds (see Table. 3).

For the Union of BRICS (Brazil, Russia, India, China and South Africa) in the ARWU for 2015-2016 years we will receive the sum of five terms for each country of the Union, respectively:

Table. 3. Dynamics of ARWU ranking for selected countries
Statistics by Country 2013/2014/2015201320

Country	Top20	Top100	Top200	Top300	Top400	Top500
Brazil	- / - / -	- / - / -	1/1/1	1/1/1	5/5/4	6/6/6
Russia	- / - / -	1/1/1	1/1/1	1/1/1	2/2/2	2/2/2
India	- / - / -	- / - / -	- / - / -	- / - / -	1/1/1	1/1/1
China	- / - / -	- / - / -	7/9/10	13/19/19	26/34/37	42/44/44
South Africa	- / - / -	- / - / -	- / - / -	1/2/2	2/2/2	3/4/4

(calculation of CQE within one year is given as cumulative).

Similarly, using THE ranking for the BRICS countries for 2015-2016 years, we get the following picture (Table. 4)

Table. 4. THE World University Rankings 2015-2016 of BRICS countries universities.

Rank	Title	Country
=42	Peking University	China
=47	Tsinghua University	China
=120	University of Cape Town	South Africa
=161	Lomonosov Moscow State University	Russian Federation
201-250	University of São Paulo	Brazil
201-250	Fudan University	China
201-250	Peter the Great St Petersburg Polytechnic University	Russian Federation
201-250	University of Science and Technology of China	China
201-250	University of the Witwatersrand	South Africa

251-300	Indian Institute of Science	India
251-300	Nanjing University	China
251-300	National Research Nuclear University MePhI	Russian Federation
251-300	Tomsk Polytechnic University	Russian Federation
251-300	Zhejiang University	China
301-350	Kazan Federal University	Russian Federation
301-350	Shanghai Jiao Tong University	China
301-350	Stellenbosch University	South Africa
351-400	Indian Institute of Technology Bombay	India
351-400	State University of Campinas	Brazil
351-400	Sun Yat-sen University	China
401-500	East China University of Science and Technology	China
401-500	Indian Institute of Technology Delhi	India

And respectively:

$$CQE_{THE} = (1.0 * 2) + (0,9 * 2) + (0.8 * 10) + (0.7 * 6) = 18.$$

Thus, using ARWU, THE and QS data rankings, we get CQE metrics for these unions (Table. 5).

Table. 5. Calculation CQE of unions in ARWU, THE, QS ranking.

Name	CQE -ARWU			CQE -THE			CQE -QS		
	2013	2014	2015	2013	2014	2015	2013	2014	2015
EU and United Kingdom	106,8	127,0	125,0	146,3	145,1	155,8	149,6	147,6	142,2
NATO	235,1	247,5	249,5	221,4	235,1	245,7	227,0	221,6	214,9
AU	1,5	1,6	1,6	0,0	2,4	2,4	3,0	3,0	2,3
UNASUR	4,6	4,6	4,6	2,3	3,1	1,5	9,3	8,1	8,1
ASEAN	1,7	2,5	2,5	2,7	2,7	2,0	8,1	8,9	8,1
EAEU	1,7	1,7	1,7	0,8	1,7	4,0	5,3	5,2	5,3

SCO	21,9	28,3	29,1	8,8	10,4	10,6	14,8	16,3	18,0
The Silk road	20,2	26,6	27,4	8,0	8,8	6,8	11,0	12,3	14,2
BRICS	27,8	34,3	35,8	16,3	17,4	18,0	21,9	23,3	27,1
TPP	161,7	167,6	158,4	145,4	144,8	141,2	125,2	125,9	127,2
AA PB	25,6	32,8	35,0	26,1	27,0	23,3	30,4	33,8	36,0

The table shows a weak volatility dynamics of unions' ratings, calculated by various international rating agencies over the past three years. So, slight fluctuations of European Union CQE and NATO caused by Germany's desire to see its universities in the top international rankings. For that reason in 2005, a project was launched to improve the quality of German universities and research institutions in general Excellence Initiative (DFG Excellence Initiative 2005-2017).

In addition, it is evident that the development project of higher education system in China, started in 1998, the so-called "Project 985" and the project of increasing competitiveness of Russian universities "5 top 100", launched in 2012, began to give results in the unions, where the leaders are China and/or Russia (SCO, BRICS). There is an increase in the quality of education according to CQE metric in these unions, but comparing with the European Union, the United Kingdom leaving EU and alliances with the participation of the United States, today they are five times lower. Taken into account the significant conservatism of such a process, this suggests that the pace of development of the quality of education in Russia and China, unless they are significantly adjusted to be high, will not allow reaching the educational level of leading countries in Europe, USA and Australia in the next 30 - 50 years.

The unions of African States increase the quality of education mainly thank to the efforts of the South African Republic, and the Union of Latin American countries (UNASUR) – the efforts of Brazil and Mexico. Dynamics of CQE in these countries is close to the dynamics of Russia.

In accordance with statistics (International migration of students, 2014) almost 5 million students in the world are currently receiving their education outside their own country. Since 2000, this number has grown by 140%, with average rate 10% per year. According to the latest available statistics, the USA attracted the highest number of foreign students and 16.5% of the total. After that comes the UK 13%, Germany 6.3%, France 6.2% and Australia 6.1%. These five countries account for about half of all foreign students in the world. However, as the total number of foreign students in the world is growing rapidly, the proportion of those who choose the USA for studying on the contrary shrinking from 23 percent (475 000) in 2000 to 16.5% (710 000) in 2001.

Because of necessity to keep a technological advantage, especially in the field of critical technologies, the nature of student migration will gradually change the focus from the global world to a predominantly inner-union. For some time for bachelors in the countries of the unions will remain the external migration to the countries, leading in the field of international education but staying outside the unions.

Arguing thus will receive student inner-union migration flows (Table. 6). As the population census in different countries were conducted in different years, the number of people in unions are not synchronized by date, and are approximate.

Table. 6. Inner-union student migration flows.

Name	Union countries taking students (donors)	The population of countries of the Union, sends students (recipients)
EU and	UK, Germany, France	297 421 542

United Kingdom		
NATO	US, UK, Germany, France	335 089 249
AU	South Africa	876 561 549
UNASUR	Brazil	194 393 709
ASEAN	Singapore	590 687 600
EAEU	Russia	36 219 684
SCO	China, Russia	73 709 443
The Silk road	China	67 791 722
BRICS	Brazil, Russia, India, China, South Africa	0
TPP	USA, Japan, Australia	308 971 931
AA PB	China	556 207 188

The transfer of competencies, including critical technologies, in political and economic alliances largely depends on the level of education of the donor countries of the unions. Analysis of table 6 allows concluding that those unions where the education donors are the countries from the five leading educational powers today are more preferable to raise the union's level of education. Moreover, tracking the dynamics of programmes/projects, improving the competitiveness of universities in various countries, we can assume that in the next 20 to 30 years the picture in this part will remain essentially unchanged.

4. Discussion

Analysis of publications in the field of globalization of higher education over the last three to five years clearly indicates the fact that this problem in the interpretation of the creation of a unified global space left "first pages" of scientific publications. Three main topics of globalization of higher education are being actively discussed today.

The first direction is to study the issues of education globalization in individual countries, for example the impact of globalization strategy for higher education in South Africa (Popescu Florentin, 2015), challenges analysis of Romanian higher education system in the context of globalization (Iatagan 2015), the impact of globalisation on changes in higher education system of multi-ethnic Kazakhstan (Turumbetova 2014), to fiscal policy in China provinces (Jia Qiong and Ericson 2017) or civil participation in the Malaysian higher education (Seyedali Ahrari and other 2016) and others.

The second field of research is the attempt to understand possible limitations and negative consequences of education globalization and to answer the question "Why does the vector of education globalization come up on something, starts to diverge?" Here this phenomenon is being actively discussed and trying to be explained by indirect causes, for example using only neoliberal strategies of evaluating activities of universities (Gayá Patricia and Brydon-Miller Mary 2016). Alternatively, attempts to understand this phenomenon by structuring the process of educational services export and underlying the factors influencing the involvement of students from other

countries are done (Kosevich and Kozhina 2016). Among a dozen of factors, influencing the effectiveness the educational services export "the presence of geopolitical, economic, historical and cultural links between the exporting country and the importing country" is highlighted, but it has not been given the appropriate value.

Finally, the third direction of publications on the education globalization is devoted to the identification of underlying processes, taking into account the geopolitical events of recent times. Such as military actions and economic sanctions of some states and blocs of states against the others, thereby fixing a smooth transition to the solution of global problems, including the formation of new critical technologies in selected economic and military blocs of states. Here we are not interested in generalized ratings of individual universities but aggregated rankings of national higher education systems (UNIVERSITAS 21: Rating national systems of higher education in 2016) from the one hand and the study of the demand for engineering and scientific personnel in different countries on the other (The "brain drain" from Russia has increased over the past year and a half, 2015).

Approach proposed in the article to the study of education globalization processes development in the world with regard to the membership of individual countries in military and economic unions, allows seeing the possible ways of adjusting the vector of globalization, based on the introduced metric of the current quality of education and expected student migration. The question of choice of introduced coefficients threshold values of the significance of data introduced year by year, and obtaining statistical values needs to be developed further, for example, with the involvement of simulation models of global education.

5. Conclusion

Using this approach to study the process of education globalization in the world taking into account the explicit and latent military, economic and trade unions will give an opportunity to determine the direction of development of this process taking into account the rapidly changing geopolitical situation. Focused analysis of the process of education globalization having been done, taking into account the unions of the states. It is based on two introduced evaluate metrics of the educational potential of the union and expected student migration in the countries of the union and allows to draw the following conclusions.

Finishing methods of competent personnel professional training in promising areas of research and development, including critical technologies must be protected by the military and economic unions of states on a par with technological and commercial secrets.

To evaluate the educational potential of unions in promising areas of research and development as a metric of current quality of education (CQE) the use of evaluated indicators of universities success of states of the union using the most famous international rankings ARWU, THE, QS.

As a metric of expected student migration (ESM) within the union, it is proposed to use the algorithm of relative redistribution of students among countries of the union, depending on the values of their average international rating.

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1. National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), Kashirskoe avenue, 31 115409, Moscow, Russia. Email: KSZajtsev@mephi.ru

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