

# Advisory and Accounting Tool for Safe and Economically Optimal Choice of Online Self-Education Services

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**Abstract.** This paper considers the review of three popular online educational platforms and their comparative characteristics of receiving course certificates, multilingualism resource, a free course availability and a resource cooperation with leading universities and companies. The importance and the positive aspects of self-education are emphasized. The most popular educational channels and YouTube videos that are used by people all over the world are analyzed. The most popular courses, which are studied, and the main elements of educational videos promoting the better mastering of information and the more interesting presentation of materials are determined. This paper also contains a top ranking of the most popular educational channels and the current state of the Ukrainian educational content on YouTube. The leading countries that have the largest number of educational videos and informative content are determined. The online self-education helps to develop both an activity scope on the whole and a specific question or problem. The advices system for the optimal online educational service selection is proposed. Also, in this paper proposed the methods of efficiency determination and rating of the optimal and secure selection of educational online service.

**Keywords:** Education; Educational Online Service; Online educational platforms; Self-education; Online-education; Advices System; Content.

## 1 Introduction

Dynamics and an active process of informing modern society for the successful implementation require the individual's continuous development and improvement. The search of useful and at the same time relevant information, its reflection and analysis, transferring the information into knowledge, the timely application of knowledge into practice, free sharing and distributing them in a professional company all these are very important for a person. In addition, the labor market of current proposals often

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motivates people to so-called reformat the professional activities, as in basic university education system the new knowledge may very often be irrelevant or inadequate. In both cases, an important tool to meet the professional and educational needs, as well as informational requests and interest is self-education.

The present practice shows that self-education helps people not only to learn the details or specific issues of the subject, but also to find their vocation, to a certain extent to meet their communication and informational needs. The self-education feature is its help in enriching the informational human capital, which its competitiveness on the labor market depends on.

Self-education helps to enrich the informational human capital, which its competitiveness on the labor market depends on. This activity contributes to a rapid self-development that, as a result, increases the level of self-control and discipline.

In the self-education process a person has the informational freedom, which allows studying the materials interesting to the subject of studying and, as a result of "free" thinking, new thoughts, ideas, plans appear and if they are developed, innovations, startups, which can be put into reality, are obtained.

No structure is willing to employ a specialist with a standard type of thinking, which was founded by the traditional form of education, so every member of society has to be adapted individually to the professional activity by maximum using the available human capital in it.

Self-education allows a person to recognize and highlight specific aspects of life, a tendency of analyzing facts, understanding of patterns, focusing on the future professional orientation needs to communicate, express their particular views about something, self-organization, commitment, anticipation of new challenges and the ways of their elimination.

## **2 Analysis of the Most Popular Online Self-Educational Service**

Today, there are a lot of mostly free, online platforms for studying and further specializing in various fields. Among them, the most popular are online courses on topical subjects such as programming and the basics of creating a startup business, economics and economic theory, network marketing and online media. The legal issues both in the professional activities and in the daily life of a citizen, as well as the development of "basic" languages are also important for self-education. The most popular online platforms available to Ukrainian users are: Prometheus; Coursera; and FutureLearn.

Prometheus [1] is the Ukrainian public massive open online courses project. The purpose of the project is to provide a free access to the university level courses for everyone in Ukraine.

The users of this online platform have the opportunity to take courses in programming, entrepreneurship, creating and developing business, psychology and techniques of effective communication, law, management, foreign languages and others. Prometheus offers and carries out the cooperation with leading universities (the courses are given by the teachers KPI, Kyiv-Mohyla Academy, Kyiv National University), and

companies and organizations (Apple Consulting, “Spektor Law Firm”, Microsoft, LITS, IBM, EPAM, VideoGorillas).

Coursera [2] is an educational platform that offers everyone online courses of leading universities and organizations around the world. Coursera was launched in April 2012 with the cooperation of Stanford, Princeton, of Pennsylvania and Michigan Universities. Later 12 other higher education institutions in the world joined the project. Today, their total number is about 60. Coursera offers online training in the following areas: engineering, social, computer, biomedical sciences, business, personal development and learning foreign languages.

Future Learn [3] is a massive online platform founded in December 2012. Future Learn offers a great variety of courses of leading UK and international universities and institutions with huge archive of the cultural and educational material, such as British Council, the British Library, the British Museum and the National Film and Television School.

In addition, the online platform cooperates with a number of internationally renowned organizations - from professional organizations such as the Association of Chartered Certified Accountants (ACCA) and the Institute of Technique and Technology (IEPP) to companies such as the BBC and Marks & Spencer, the UK Government.

**Table 1.** Comparative characteristics of online training platforms

Characteristics of online platforms	Online learning platforms		
	Prometheus	Coursera	Future Learn
To obtain a certificate of the course	+	+	+
Multilingual resources (including Ukrainian)	+/-	+	-
The availability of free courses	+	+/-	+
The access from a variety of electronic devices	-	+	-
Cooperation of the resource with leading universities and companies	+	+	+
Mandatory registration	+	+	+

Among the variety of online platforms for self-education and self-development for the user, there is the question of electing the most optimal and the most effective resource according to certain criteria. For a visual example, let us analyze above mentioned Prometheus, Coursera and Future Learn according to several criteria.

## **2.1 Comparative analysis of educational YouTube-Channels**

Online platforms allow studying a particular area or discipline as a whole; however, YouTube channels and their special videos provide more specific information concerning a particular issue or problem. Category “Education on YouTube” is getting more popular every day, which means the entertainment portal visitors like watching science-fiction and educational videos more and more.

An important positive feature of this training is a hands-on experience of leading speakers, scholars, teachers, professionals and progressive people or a presentation of the theoretical knowledge that the informational customer needs to practice more than 60%. From the psychological point of view, if in the video a person sees the personality, who is popular, who achieved great success in his work or the caller likes his appearance, then the information is better remembered and easily perceived. In addition, in such training videos we can see visual instructions how to use a particular device, gadget, to hear a detailed description, pros and cons from the first word.

However, expanding horizons through the Internet, a person himself has to dig in a huge flow of resources that can detract from the core. Another important feature of educational videos is not the quantity but the quality of the material. Therefore, there are video resources that specialize in one particular direction and the best quality information is provided exactly there.

The most popular areas are: programming, foreign languages, business, marketing, consulting, medicine, chemistry, physics, biology, history, art, that is, everything related to the professional growth and expansion of the knowledge base that allows solving the required tasks and problems practically and effectively.

YouTube video provides the information from both domestic and foreign sources, which can include subtitles in other languages to facilitate the perception of the gained knowledge. That is, in five minutes you can learn that you will have to read for half an hour. So a minute and a half news clip a half-minute commercials, snippets, titles, collages, short news and interesting computer graphics contribute to a better memorization and as a result, study of a particular subject [9].

According to the publication Forbes [4], the videos of one of the leading education platforms KhanAcademy got more than 500 million views as a whole.

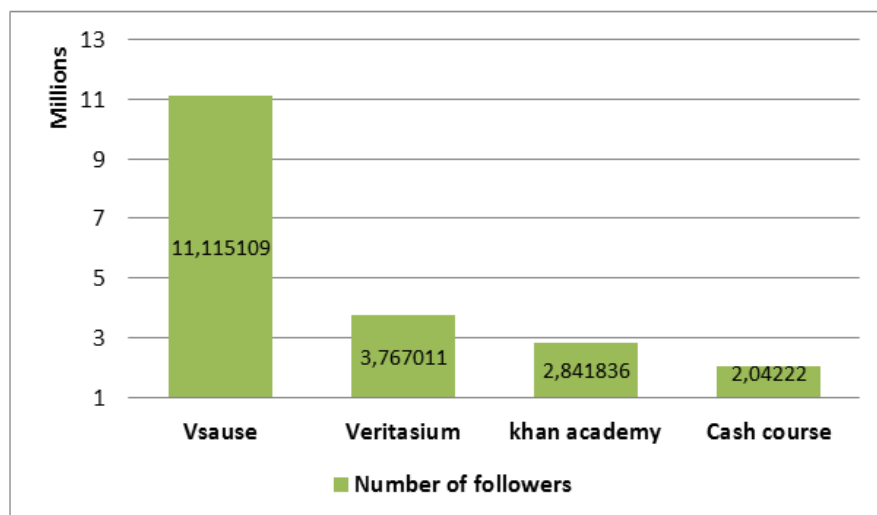


Fig. 1 The most popular educational channels and the number of followers

Khan Academy [5] uses the stories, supported by key points written by hand, VSause is the charisma of a presenter, Veritasium is tricks and news reportage shooting, Crash Course is animation. Dynamic YouTube videos with constantly changing plans, short episodes with using “mental hooks” (jokes, famous savers) are a reference to the concentrated knowledge in a colorful package. They stimulate the informational requester to form some fundamental knowledge [9]. Derek Mueller, the creator of Veritasium [6], and the bright representative of online teachers believes that the best way of learning is the learning face to face. If out of half a million people, at least one of the tenth part will interest the words of the teacher, then in a few years a thousand professionals enthusiastic can be received [9].

The Ukrainian educational content on YouTube has a rapid development. There are also tracings of the foreign projects in Russian. For the experiment, on the YouTube search the keyword “online education” in different languages was entered.

The leaders of these videos were English-speaking countries, Spain and Russia (Figure 2).

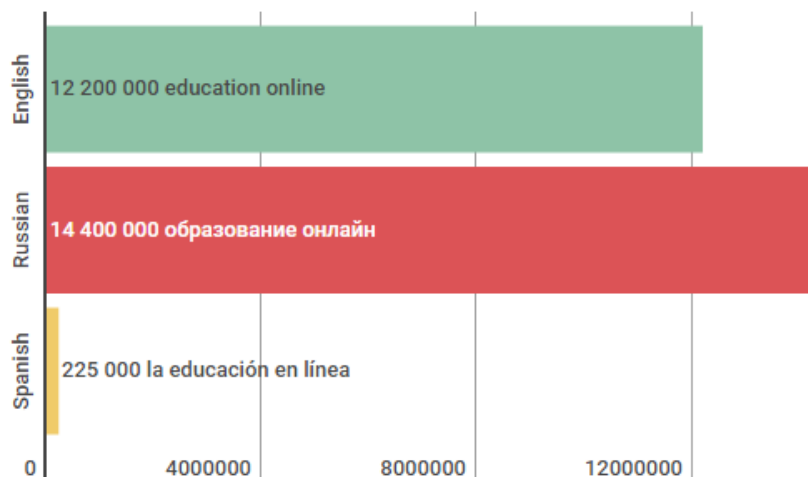


Fig. 2 Leaders on the number of videos

Germany, Ukraine, Arabian countries, Italy, France, China, Poland and the Czech Republic have also high rates.

Overall, the rates range from 7,770 videos to 12.2 million videos and are growing continuously (Figure 3).

Assessing the first videos from the proposed list after the search, the number of views shown in the diagram was separated (Fig. 4).

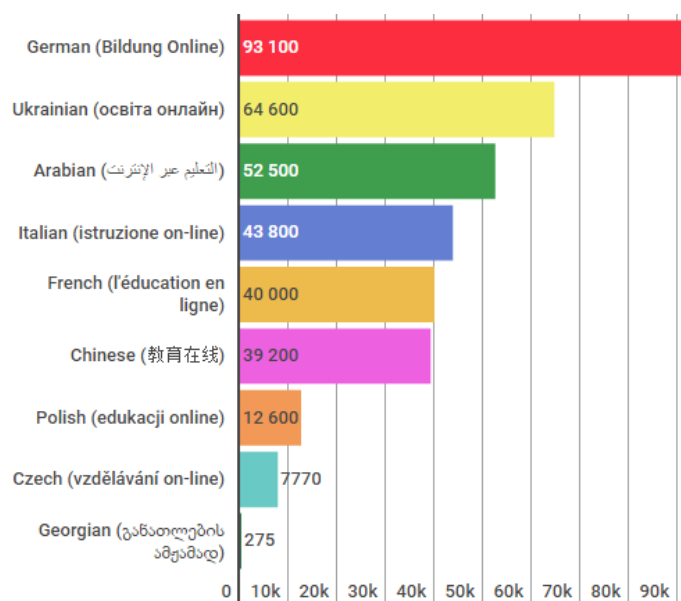


Fig. 3 The number of videos and search keywords

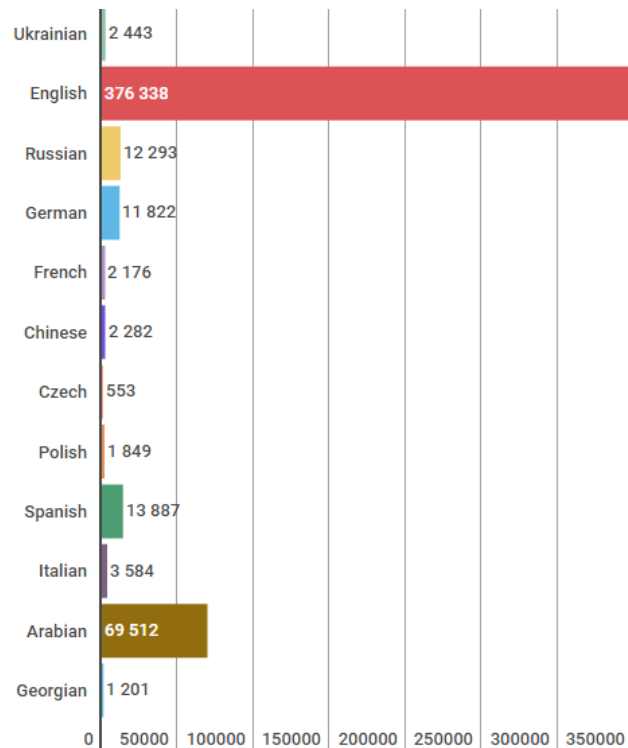


Fig. 4. The number of views of the first video on the list after searching

The absolute leader remains the English-language video with a maximum number of 376,338 views. The Arabian and Spanish videos have high rates with the relevant numbers of 69,512 and 13,887 views.

Thus, one can argue that the nature of educational videos on YouTube are just beginning and quickly becoming actual and popular, while the English-speaking countries are safe to use these resources to self-education. Online platforms have their advantages, as they can be perceived as more serious, and a “student” as a result can obtain a diploma or certificate. That all depends on the interest and the interests of people, as a self-education has no limits. And the simpler the given information is, the better it is perceived and remembered. And then, in the process of analyzing, the studied material, the new thoughts and ideas can serve as the basis for innovative thinking. That’s why a self-education is an integral part of the human activity, which includes elements of motivation, interest and self-organization and as a result all those give impetus to the person progress and realization in the whole.

### 3 Efficiency of Secure and Optimal Selection of Online Self-Educational Service

The total value of the customer parameters for educational online service is determined by the following equation:

$$Customer_i^{EdOnS} = \sum_{k=1}^{N_i^{Prm}} w_n \times Prm(Cust_i)_k \quad (1)$$

where  $Prm(Cust_i)_k$  is a set of customer parameters that selects the educational online service;  $N_i^{Prm}$  is number of these parameters;  $w_1, w_2, \dots, w_n$  is weight factors each parameter for choosing optimal educational online service, defined expert, with  $\sum_i w_i = 1$ ,  $w_i \geq 0$ . The  $\sum_{k=1}^{N_i^{Prm}} w_n \times Prm(Cust_i)_k$  is consisting of nine parameters:

$$Customer_i^{EdOnS} = \left\{ \begin{array}{l} w_1 \times finc(Cust_i) + w_2 \times ft(Cust_i) + w_3 \times bs(Cust_i) + \\ + w_4 \times kns(Cust_i) + w_5 \times gloc(Cust_i) + w_6 \times g(Cust_i) + \\ + w_7 \times lkn(Cust_i) + w_8 \times seda(Cust_i) + w_9 \times ag(Cust_i) \end{array} \right\} \quad (2)$$

where  $finc(Cust_i)$  is the level of financial income of the i-th customer  $Cust_i$ ;  $ft(Cust_i)$  is the free time of the i-th customer  $Cust_i$ ;  $bs(Cust_i)$  is the basic skills of the i-th customer  $Cust_i$ ;  $kns(Cust_i)$  is the level of knowledge in the subject area of the i-th customer  $Cust_i$ ;  $gloc(Cust_i)$  is the geographical location of the i-th customer  $Cust_i$ ;  $g(Cust_i)$  is the language knowledge of the i-th customer  $Cust_i$ ;  $lkn(Cust_i)$  is the goal to study of the i-th customer  $Cust_i$ ;  $seda(Cust_i)$  is the self-education ability of the i-th customer  $Cust_i$ ;  $ag(Cust_i)$  is the age of the i-th customer  $Cust_i$ ;  $w_1, w_2, \dots, w_9$  is weight factors each parameter for choosing optimal educational online service, defined expert, with  $\sum_i w_i = 1$ ,  $w_i \geq 0$ .

The total value of the course parameters is determined by the following equation:

$$Course_i^{EdOnS} = \sum_{p=1}^{N_i^{Prm}} c_n \times Prm(Crs_i)_p \quad (3)$$

The  $\sum_{p=1}^{N_i^{Prm}} c_n \times Prm(Crs_i)_p$  is consisting of four parameters:

$$Course_i^{EdOnS} = \left\{ \begin{array}{l} c_1 \times Course_i^{BSOpt}(Crs_i) + c_2 \times Course_i^{EdPrc}(Crs_i) + \\ + c_3 \times Course_i^{Auth}(Crs_i) + c_4 \times Course_i^{Stf}(Crs_i) \end{array} \right\} \quad (4)$$

where  $Course_i^{BSOpt}(Crs_i)$  is the parameters of basic course options;  $Course_i^{EdPrc}(Crs_i)$  is the parameters of educational process of es;  $Course_i^{Auth}(Crs_i)$  is the parameters of authority of courses;  $Course_i^{Stf}(Crs_i)$  is the parameters of staff of courses;  $c_1, c_2, \dots, c_4$  is weight factors each parameter of the course, defined expert, with  $\sum_n c_n = 1$ ,  $c_n \geq 0$ .

The total value of the parameters of basic course options  $Course_i^{BsOpt}(Crs_i)$  is calculated using the following equation:

$$Course_i^{BsOpt}(Crs_i) = \left\{ \begin{aligned} &k_1 \times tl(Crs_i) + k_2 \times sb(Crs_i) + k_3 \times tm(Crs_i) \\ &+ k_4 \times dr(Crs_i) + k_5 \times cs(Crs_i) + k_6 \times tp(Crs_i) \end{aligned} \right\} \quad (5)$$

where  $tl(Crs_i)$  is the title of the i-th course  $Crs_i$ ;  $sb(Crs_i)$  is the subject of the i-th course  $Crs_i$ ;  $tm(Crs_i)$  is the Themes of the i-th course  $Crs_i$ ;  $dr(Crs_i)$  is the duration of the i-th course  $Crs_i$ ;  $cs(Crs_i)$  is the cost of the i-th course  $Crs_i$ ;  $tp(Crs_i)$  is the type (group or individual) of the i-th course  $Crs_i$ ;  $k_1, k_2, \dots, k_6$  is weight factors each parameter of the course, defined expert, with  $\sum_i k_i = 1$ ,  $k_i \geq 0$ .

The total value of the parameters of educational process  $Course_i^{EdPrc}(Crs_i)$  is calculated using the following equation:

$$Course_i^{EdPrc}(Crs_i) = \left\{ \begin{aligned} &f_1 \times it(Crs_i) + f_2 \times cl(Crs_i) + f_3 \times hw(Crs_i) \\ &+ f_4 \times ts(Crs_i) + f_5 \times cn(Crs_i) + f_6 \times cd(Crs_i) \\ &+ f_7 \times crt(Crs_i) + f_8 \times inac(Crs_i) + f_9 \times wt(Crs_i) \\ &+ f_{10} \times tc(Crs_i) + f_{11} \times tt(Crs_i) + f_{12} \times adp(Crs_i) \end{aligned} \right\} \quad (6)$$

where  $it(Crs_i)$  is the intensity of training;  $cl(Crs_i)$  is the conditions of learning;  $hw(Crs_i)$  is the giving and checking homework;  $ts(Crs_i)$  is the level of providing support teacher;  $cn(Crs_i)$  is the number of classes;  $cd(Crs_i)$  is the duration of classes;  $crt(Crs_i)$  is the course type (online / offline);  $inac(Crs_i)$  is the individual account (24/7, question / answer, feedback);  $wt(Crs_i)$  is the type of work (work in a group or individual);  $tc(Crs_i)$  is the trial classes;  $tt(Crs_i)$  is the test after each studied topic;  $adp(Crs_i)$  is the additional possibilities;

$f_1, f_2, \dots, f_{12}$  is weight factors each parameter of the course, defined expert, with  $\sum_i f_i = 1$ ,  $f_i \geq 0$ .

The total value of the parameters of authority of courses  $Course_i^{Auth}(Crs_i)$  is calculated using the following equation:

$$Course_i^{Auth}(Crs_i) = \left\{ \begin{aligned} &a_1 \times vr(Crs_i) + a_2 \times lsn(Crs_i) + a_3 \times cr(Crs_i) \\ &+ a_4 \times cv(Crs_i) + a_5 \times rank(Crs_i) \end{aligned} \right\} \quad (7)$$

where  $vr(Crs_i)$  is the reviews of previous visitors;  $lsn(Crs_i)$  is the availability of a license;  $cr(Crs_i)$  is the recognition of certificates by firms;  $cv(Crs_i)$  is the certificate validity;  $rank(Crs_i)$  is the rank among other courses;  $a_1, a_2, \dots, a_5$  is weight factors each parameter of the course, defined expert, with  $\sum_i a_i = 1$ ,  $a_i \geq 0$ .

The total value of the parameters of course staff  $Course_i^{Auth}(Crs_i)$  is calculated using the following equation:

$$Course_i^{stf}(Crs_i) = \left\{ \begin{array}{l} s_1 \times qt(Crs_i) + s_2 \times te(Crs_i) + \\ s_3 \times tr(Crs_i) + s_4 \times vtr(Crs_i) \end{array} \right\} \quad (8)$$

$qt(Crs_i)$  is the teacher qualification;  $te(Crs_i)$  is the teacher experience;  $tr(Crs_i)$  is the teacher rating;  $vtr(Crs_i)$  is the reviews of previous visitors about the teacher;  $s_1, s_2, \dots, s_4$  is weight factors each parameter of the course, defined expert, with  $\sum_i s_i = 1, s_i \geq 0$

The rating of educational online services according given parameters for research is determined by the equation (9):

$$R_i^{EdOnS} = \frac{\sum_{k=1}^{N_i^{Prm}} w_n \times Prm(Cust_i)_k + \sum_{p=1}^{N_i^{Prm}} c_n \times Prm(Crs_i)_p}{N^{EdOnS}} \quad (9)$$

$Prm(Cust_i)_k$  is the customer parameters value for optimal educational online service selection;  $Prm(Crs_i)_p$  is the course parameters value that customer which customer has specified for the course selection;  $N^{EdOnS}$  is the number of courses.

Efficiency of optimal educational online service selection is calculated using this equation:

$$Ef = \frac{N_p}{N_p - N_n}, N_p \neq N_n \quad (10)$$

where  $N_p$  is the number of courses, which meet the requirements of more than half of the requirements;  $N_n$  is the number of courses, which does not fully fit the user's requirements.

Consequently,  $Ef \in [0, 1]$ .

The scheme of advices system for the optimal online educational service selection is shown in Fig. 5.

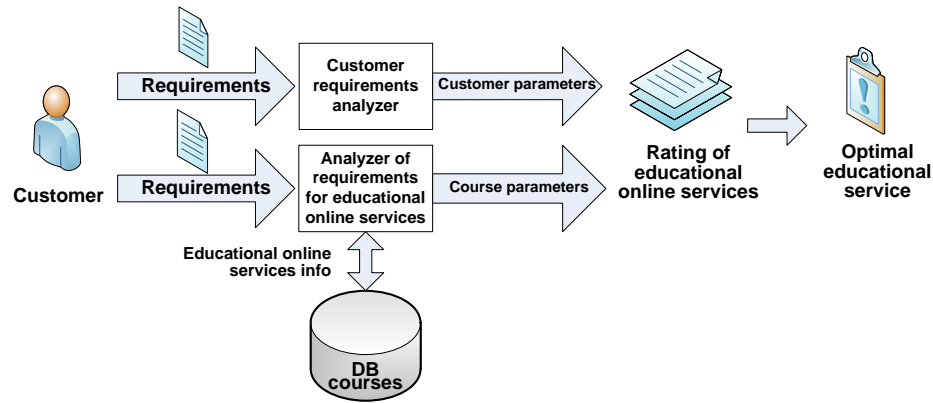


Figure 5. The scheme of advices system for the secure and optimal online educational service selection

## 4 Conclusion

An important problem of self-education was considered in this paper. Modern businesses require group efforts, cooperation, and an effective communication from employees. At the same time, interactive teaching methods allow each student to express his personal knowledge, and some personal traits. A self-education plays an important part in building a human knowledge capital, and it has many benefits. It gives an opportunity to manage their own time, determine the range of interests in any location. Online platforms provide online courses of leading universities and organizations. Courses include recorded video lectures, auto-graded and peer-reviewed assignments, and community discussion forums. Prometheus online educational platform is successful for the Ukrainian consumers, because the materials are free and presented in Ukrainian, video lectures, tests and forums are available round the clock. The courses, available on the site, cover a wide range of human interests. The most popular courses are: programming, psychology, information management, economics, communication tools, policy, marketing, foreign languages, data visualization, analysis and business. The courses are available in Ukrainian, English and Russian. There are already some paid courses there. The most popular specializations are: a machine education, science of information, project management, business foundations, Big Data. Online Future Learn platform includes some courses in English. Popular online course categories are: languages and cultures, business and management, science, math and technology, health and psychology, creative arts and media. Online learning offers a new way to explore subjects you're passionate about. Online educational platforms and channels on YouTube are gaining popularity day by day and expand their content. It can be argued that this self-education has many chances to replace full-fledged university studies. The Ukrainian-speaking consumers should know English. However, resources for studying it are more than enough. Online self-education has no age or financial restrictions. It can be argue that online self-education is the future one.

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