Comparative analysis of online dictionaries in the context of the digital transformation of education

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Abstract

The article is devoted to a comparative analysis of popular online dictionaries and an overview of the main tools of these resources to study a language. The use of dictionaries in learning a foreign language is an important step to understanding the language. The effectiveness of this process increases with the use of online dictionaries, which have a lot of tools for improving the educational process. Based on the Alexa Internet resource it was found the most popular online dictionaries: Cambridge Dictionary, Wordreference, Merriam–Webster, Wiktionary, TheFreeDictionary, Dictionary.com, Glosbe, Collins Dictionary, Longman Dictionary, Oxford Dictionary. As a result of the deep analysis of these online dictionaries, we found out they have the next standard functions like the word explanations, transcription, audio pronounce, semantic connections, and examples of use. In propose dictionaries, we also found out the additional tools of learning foreign languages (mostly English) that can be effective. In general, we described sixteen functions of the online platforms for learning that can be useful in learning a foreign language. We have compiled a comparison table based on the next functions: machine translation, multilingualism, a video of pronunciation, an image of a word, discussion, collaborative edit, the rank of words, hints, learning tools, thesaurus, paid services, sharing content, hyperlinks in a definition, registration, lists of words, mobile version, etc. Based on the additional tools of online dictionaries we created a diagram that shows the functionality of analyzed platforms.

Keywords

online dictionary, electronic dictionary, English, education, tools of English learning

1. Introduction

The problem of digitalization of education is a topical theme for discussions [1]. The solution to these problems will contribute to the creation of conditions for the update of forms, tools, systems, technologies, and methods of teaching disciplines and the sharing of knowledge. Digital transformation as a global trend of the modern world contributes to the integration of Ukrainian education into the European Education Area [2, 3, 4, 5]. The change of paper-based data into electronic-based is an indisputable example of the digital transformation in education that is still in the process.

In general, use of dictionaries for learning and interpretation of terms is relevant in the study of foreign languages. When using a dictionary, the students can expand their vocabulary, to find the meaning of a word, to build an associative series of terms, to improve the pronunciation, to avoid monotony in learning English.

The digitalization of education has created the conditions for the transformation of paper dictionaries into electronic-based [6] and the development of electronic tools for teaching a foreign language in general [7, 8, 9, 10, 11, 12]. When digital technologies began to develop the previously existing monopoly on knowledge has disappeared. Now everyone can use the knowledge and create it. This provides the main trends in education – free access to education and using open resources [13, 14].

In many developed countries, paper dictionaries were replaced by online counterparts that become an integral element of the educational process. To increase its competitiveness publish houses like Longman, Cambridge, Chambers, Oxford made electronic versions of many printed publications and develop online services for English education. Nowadays these platforms are sources of learning information and include a lot of educational functions. Of course, online dictionaries more functionality than paper-based. They can have functions like to search, listen to the pronunciation, view examples including multimedia, get professional advice, make your own word list, etc.

2. Related works

An analysis of recent research and publications indicate that the problem of online dictionaries in the context of the digital transformation of education is attracting the attention of a lot of researchers. Ranka Stanković, Cvetana Krstev, Biljana Lazić and Mihailo Škorić have considered transformation electronic dictionaries - from file system to based lexical database [15]; Rastislav Metruk researched the use of electronic dictionaries for pronunciation practice by university students [16]; Anna Dziemianko investigated on the usefulness of paper and electronic dictionaries [17]; Sameer Naser Olimat found out the positive and negative impact of technology and information revolution on compiling the dictionary [18]; Robert Lew researched and classified the online dictionaries of English [19]; Amy Chi gave a review of Longman Dictionary of Contemporary English (6th edition) and found out whether the dictionary satisfies the needs and expectations of the users [20]. Christian M. Meyer and Iryna Gurevych explored the possibilities of collaborative lexicography by using Wiktionary [21]; Dikshit Kumar, Agam Kumar, Man Singh, Archana Patel and Sarika Jain clarified the difference between all existing online dictionaries and thesauruses by using an effective parameter [22]; Rezaei Mojtaba and Davoudi Mohammad found out the influence of electronic dictionaries on vocabulary knowledge extension [23]; Dmytro Pryimak found out the main mistakes of online dictionaries in the context of incomplete information, providing incorrect translations, and using incorrect lexical and grammatical constructions [24]; Ilona Kostikova highlighted the theoretical underpinnings of the efficiency of using electronic dictionaries at English lessons [25].

The above-mentioned authors have made a significant contribution to the theory and practice of using online dictionaries to learn a foreign language. The works mention individual dictionary resources, describe their functions, but we do not find a comparative analysis of

online dictionaries. Thus, the main purpose of our research is a comparative analysis of online dictionaries and education tools for learning a foreign (mostly English) language on these platforms.

3. Analysis of functionalities online platforms of dictionaries

In our research, we use the term is "`online dictionary`", because the systems presented in this article are positioned themselves as dictionaries. In addition, the main function of these systems is the translation of words. However, analysis of their functionality indicates that they are not just online dictionaries, but platforms in which various tools for learning a foreign language are implemented. So, we use also term is "`online platform`".

The key condition for the digitalization of education is a demand for education digital technologies and their use by users. We found out the demand for online dictionaries by users and selected 10 ranking online dictionaries. The measuring was by using the Alexa Internet resource (table 1). The rank is calculated using a combination of average daily visitors to this site and pageviews on this site over the past 3 months. The site with the highest combination of visitors and pageviews is ranked number 1. This table shows the Alexa Rank trend for this site over a trailing 90 days. The most popular are the Cambridge Dictionary, Wordreference, Merriam–Webster, Wiktionary, TheFreeDictionary.com, etc.

Table 1
The estimate of the site's popularity (Alexa Rank at 11.10.2020)

Name	Address	Rank
Cambridge Dictionary	dictionary.cambridge.org	350
Wordreference	wordreference.com	518
Merriam–Webster	www.merriam–webster.com	605
Wiktionary	www.wiktionary.org	707
TheFreeDictionary.com	www.thefreedictionary.com	771
Dictionary.com	www.dictionary.com	791
Collins Dictionary	www.collinsdictionary.com	2313
Glosbe	glosbe.com	2606
Longman Dictionary	www.ldoceonline.com	3173
Oxford Learner's Dictionary	www.oxfordlearnersdictionaries.com	3908

To detect the features of the use of online dictionaries in the study of a foreign language, we made a comparative analysis of their education functions (table 2).

We didn't analyze positions like the definition of a word, the transcription, audio pronounce of the word, the example of semantic connections, and example of use, as they are standard functions and implemented on all online translation platforms. Let's review the functions of the online platforms for learning that can be useful in learning a foreign language.

Translator. Provides for the presence on the site of a machine translation system (like Google's free service for translate). This system allows translating words instantly, phrases of a certain volume. For example, the Cambridge Dictionary machine translation system translates up to 160 characters and the Collins Dictionary up to 5.000 characters. In the Collins Dictionary,

Table 2
The functions of the online platforms for learning a foreign language (1 Cambridge; 2 Wordreference; 3 Merriam–Webster; 4 Wiktionary; 5 TheFreeDictionary; 6 Dictionary.com; 7 Glosbe; 8 Collins; 9 Longman; 10 Oxford).

Functions	1	2	3	4	5	6	7	8	9	10
Translator	+	−	−	−	−	−	−	+	−	−
Multilingual support	+	+	−	+	+	−	+	+	+	−
Video of pronunciation	−	−	−	−	−	−	−	+	−	−
Image of a word	+−	−	+	+	+	−	−	−	−	+
Discussion	−	+	−	+	+	−	−	−	−	−
Collaborative edit	−	−	−	+	−	−	+	−	−	−
Rank of words	−	−	−	−	−	−	−	+	−	+
Hints	+	+	+	+	+	+	−	+	+	+
Learning tools	+	−	+	−	+	+	−	+	+	+
Thesaurus	+	−	+	+	+	+	−	+	−	−
Paid services	−	−	+−	−	+−	−	−	−	−	+
Content Sharing	+	−	+	−	+	−	−	+	+	−
Hyperlinks	+−	+	−	+−	+	+−	−	+−	+−	−
Registration	+	+−	+	+	+	+	+	+	+	+
Lists of words	+	−	+	−	+	−	−	−	−	+−
Mobile version	+	+	+	+	+	+	+	+	+	+
Rank of Mobile version	4.2	4.5	4.5	3.1	4.8	4.6	4.4	4.3	4.5	4.3

the translator also has the function of recording a voice with a microphone. It is possible to translate what the user says. Both online platforms have the ability to automatically detect a language. As for translation languages, the Collins Dictionary provides translation of a larger number of languages, including Ukrainian, while in the Cambridge Dictionary this number is much smaller. Also, the Collins Dictionary transforms all words into hyperlinks, which give the possibility to follow each word and see translate it.

Multilingual support. Only three online dictionaries don't have multilingual function. These sites work exclusively for English-speaking audiences and are used to understand and learn English. But the sites, who have this function implemented it in different ways. For example, in the Cambridge Dictionary, this function is used only to translate a word, not to explain it. For example, if the system searches the word "car" from English to Polish, then the result is only a translation of this word into Polish. The explanation and grammar will be displayed in English.

In the Collins Dictionary translated word is accompanied by translate in other languages. There is also an example of pronunciation in the selected language and English. It is possible to listen to the searched word in different languages (figure 1).

Video of pronunciation. This function allows users to hear and to see the pronunciation of the searched word. Video pronunciation is available only in the Collins Dictionary. Video pronunciation is a video that shows how to pronounce some words. This feature is helpful because it is the best way to learn the right pronunciation [26].

Image of a word. The learning effect of using a picture of a word can be shown with the

In other languages

car

British English: car 🔊 /kɑː/ noun
A *car* is a motor vehicle with room for a small number of passengers.
They arrived by car.

American English: car 🔊
Arabic: سَيّارة 🔊
Brazilian Portuguese: carro 🔊
Chinese: 小汽车 🔊
Croatian: automobil 🔊
Czech: auto 🔊
Danish: bil 🔊
Dutch: auto 🔊
European Spanish: coche 🔊
Finnish: auto 🔊
French: voiture 🔊
German: Auto 🔊
Greek: αυτοκίνητο 🔊

Italian: automobile 🔊
Japanese: 自動車 🔊
Korean: 자동차 🔊
Norwegian: bil 🔊
Polish: samochód 🔊
European Portuguese: carro 🔊
Romanian: mașină
Russian: автомобиль 🔊
Latin American Spanish: carro 🔊
Swedish: bil 🔊
Thai: รถยนต์ 🔊
Turkish: araba 🔊
Ukrainian: авто
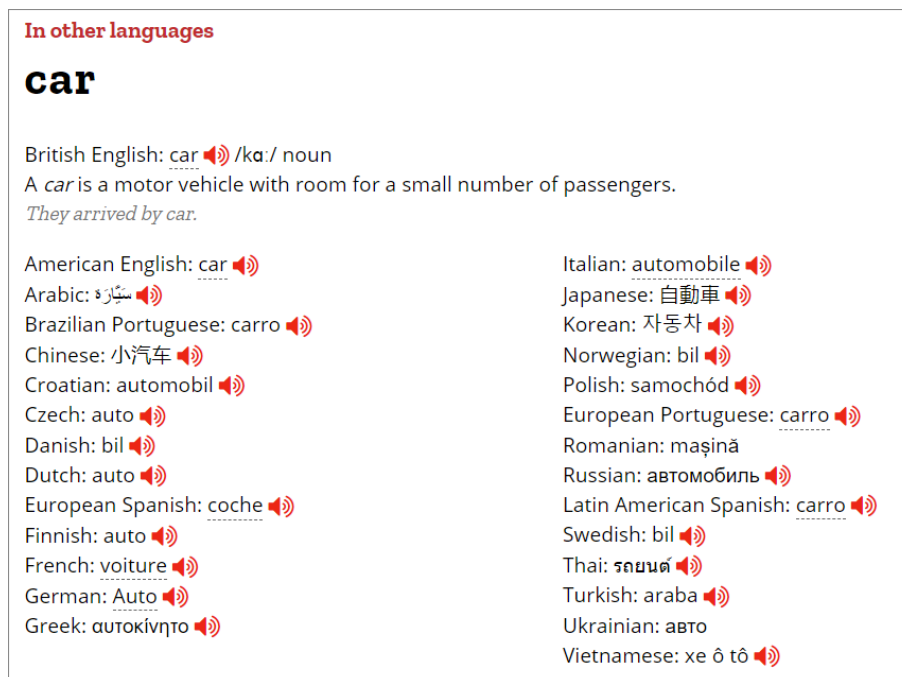Vietnamese: xe ô tô 🔊

Figure 1: Example of multilingual function in the Collins Dictionary.

expression "A picture is worth a thousand words" [27]. The illustrate of meanings is the best way to reach the result by associative. It allows you to create an associative lines and remember a word better. This creates equal opportunities for students with different perceptions of information. Some of the students work with visual information better, others with sound one, and combining these forms can improve the learning effect. Not all online dictionary platforms have this function, and some of them have this feature only when searching for the word without translating into another language. That is when the multilingual function is not used.

Discussion. This function allows users to discuss different topics. In particular, Wordreference and TheFreeDictionary have a public forum that allows users to consult about the possible translation and use of the words, its correct grammatical part, and speech pronunciation. To take part in the forum user needs to have an account.

This function is also implemented on the Wiktionary site, but it works by a non-traditional way. It is possible to discuss each page of Wiktionary, including the found words (figure 2). You don't need to create a new topic to start discussions. The discussion page is being edited and supplemented with a new comment. Using this function requires knowledge of the markup language Wiki.

Collaborative edit. Provides the ability to free edit the content of the dictionary, add new terms, change, and improve existing ones. The best example of a collaboratively built resource is Wikipedia, which has positioned as the largest encyclopedia on the world wide web. The content of collaboratively created resources is repeatedly changed before a consensus

Figure 2: Example of discussion on the Wiktionary site.

is achieved. Having the history of edit we can research the evolution of a definition. It's impossible for expert-built dictionaries because there aren't any edit history nor the discussion. Now collaboratively constructed language resources are rivaling expert-built lexicons. The collaborative construction process of these resources is driven by what is called the "Wisdom of Crowds" phenomenon or collective intelligence [21]. This is one of the main ideas of using Web 2.0 and cloud technologies [28].

Only Wikitionary and The Glosby dictionary have this function. Wiktionary is a multilingual collaborative online dictionary that is edited by users and volunteers from all world. The name "Wiktionary" is a combination of two terms "wiki" and "dictionary". Now the dictionary has about 6.432.000 articles. In the Glosby dictionary, the user can add their own translation or example of the word, edit the description of this concept.

The rank of words. This function involves assigning a word to a specific group. The word can be ranked by the place, value, complexity, importance, authority, level, the degree.

For example, the Longman Dictionary marks all the words by special symbols: W1, W2, and W3 for words that are in the top 1000, 2000, and 3000 most frequent words in written English, and S1, S2, and S3 for the top 1000, 2000 and 3000 most frequent words in spoken English. Nowadays, many learner's dictionaries include information about the most frequent words in English, but Longman dictionaries are the only ones to highlight the differences between spoken and written frequency [20].

The Oxford Dictionary analyzes words according to the Common European Framework of Reference. CEFR describes language ability on a six-point scale, from A1 for beginners, up to C2 for those who have mastered a language.

The Collins Dictionary analyzes words by the frequency of use. That is indicated by the dark red or light red circles. For example, if a word has four dark red circles the rank is named "very common".

Hints. It is an information navigational tool. It provides for the possibility to use the search method based on hints. When the user typing a word, the hint showing him different variants of a word. For example, if a user typed the word "`car`", the hint proposes variants like "`car accident`", "`alarm`", "`car boot`", etc. Hints save time because during the search user

doesn't need to remember the correct writing of the word. The system will offer similar words to the first letters.

Learning tools. Some resources position themselves not only as online dictionaries but also as resources for learning English. Such dictionaries have grammar exercises, quizzes education resources, videos, blogs, courses for studying English, etc.

For example, Cambridge and Collins's dictionaries have a separate section on grammar. Users can get clear grammar explanations with hundreds of examples of how grammar is used in natural written and spoken English.

Longman's dictionary has exercises in vocabulary, grammar, learning synonyms, idioms for users of intermediate and high levels. There are rubrics "Word of the day", "Hot topics", "Mail", "Pictures of the day" etc. It has a lot of quizzes of a different type. There are the next types of quizzes: collocations, synonyms, phrases, phrasal verbs, prepositions.

TheFreeDictionary.com proposes graphic quizzes. One of the interesting games to activate the passive vocabulary is "Hangman" (figure 3). The task is simple: you need to guess the word by the number of letters and type it in the field. If the word is not guessed, the dictionary still displays the correct answer and a link by which learners can see the full dictionary article for that word.
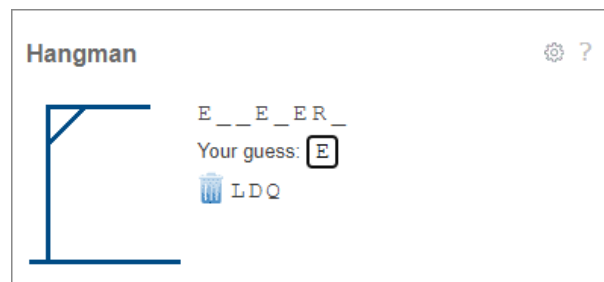

Figure 3: The quizzes Hangman on TheFreeDictionary.com.

Thesaurus. Thesaurus is a service of reference work for finding synonyms and sometimes antonyms of words. For example, Dictionary.com uses the structural principle of the thesaurus, which finds its lexicographic reflection at the macrostructural level. Words that belong to certain areas of knowledge are located on a thematic basis and have examples of their correct use in the text. For each user-defined word, the system generates lexicographic materials and presents a sample of more than 15 dictionaries.

The subject of the definition in the online dictionary is a word that includes a selection of synonyms, idioms, antonyms, examples of use, grammatical relations to another word (figure 4). The origin, development, and primary meaning of the lexical unit are also explained in the dictionary.

Paid services. These services are used as an opportunity to market and sell extra content, such as paper books, training courses, content that might be richer lexicographic data, and language testing materials, etc. All dictionaries would normally be free for use. It is difficult to demarcate clearly between free content and paid, as revenue to the publisher can take different forms. For example, personal pay-per-view or subscription-based access. Or online access to
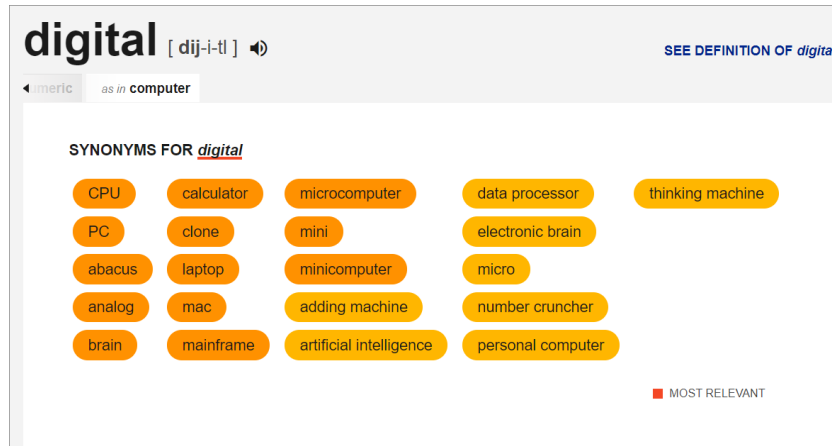
Figure 4: Example of synonyms of the word "digital" on Dictionary.com.

paid content of dictionary is offered only for buyers of paper editions [19].

Paid services are available in the Oxford Dictionary. The dictionary has premium tools to develop pronunciation and speaking skills, to plan, write, and review your work. For teachers: videos, lesson plans, and activities for use in class.

Some publishers need advertisements to cover the costs of producing and maintaining online dictionary content. This is a rather popular model of using resources at the moment. TheFree-Dictionary.com and Merriam–Webster doesn't have a paid content, but uses advertising. For example, you can make monthly payments of 2.99 dollars or 19.99 dollars per year to disable advertising on TheFreeDictionary.com.

Content sharing. This is a key function to use the knowledge on the Internet. Today, almost every active student uses social networks. Therefore, a tool for content sharing is a great opportunity to share knowledge. This tool can be used by a teacher for homework. For example, the teacher shares some words in a special group of social networks. The homework of students is an analysis of these resources. Table 2 shows that not all dictionary systems have the function of sharing information on social networks.

Hyperlinks. A hyperlink is an ability for a user quickly to jump to an unknown word without spending time searching for it. Some dictionaries don't have a hyperlink for each word at the definition. These resources have a mark with plus and minus (table 2), which indicates that not all words of the content have hyperlinks. There are also cases where all words have hyperlinks except prepositions and articles.

Registration. Almost all dictionaries have a registration function except for Wordreference, which allows you to register only on the forum. Most sites offer more features after registration. After registration, there are adding words to list, editing content, adding the user's own terms, participating in quizzes with fixing the result, creating interactive tools (such as flashcards with words), etc. For example, TheFreeDictionary.com gives users the opportunity to set their own learning goals, compete with other participants, receive awards for best results, etc.

Lists of words. The function of adding and forming word lists allows the user to return to the studied material, repeat it, and train. Only 3 online dictionaries have this function. In

the case of the Oxford Learner's Dictionaries, this feature is only available after activating a premium account.

Mobile version. The mobile version is the best way to attract more users to use the online platform. In addition, it provides an opportunity to improve a platform with a focus on user feedback and their needs. Most users, especially young people, use mobile phones to get quick access to resources anywhere and anytime. Table 2 shows the availability of the mobile version and the rating of an app among users. Some dictionaries are available in the free version, but others offer to buy the full-text dictionary.

We have also highlighted the function that is specific to an individual platform.

The function of finding similar texts. This function based on content from the Internet and available in the dictionary of Glosbe. The search result can be sorted depending on the expediency of lexical information from different source databases and dictionaries. This feature of the online resource is the main advantage for users who are not native English speakers and are looking for user services to create their own dictionary. From a technical point of view, by entering a certain word or phrase, you can get an example of the use of a word in the native language and a foreign version of its use.

Taking into account table 2, we created a diagram that clearly shows the functionality of the platforms (figure 5).
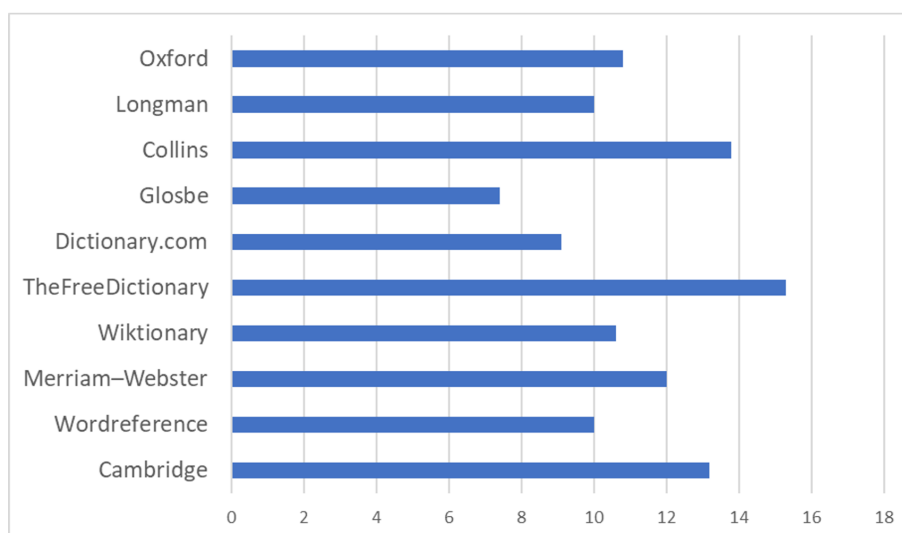

Figure 5: Diagram of the functionality of online platforms.

For the calculation, we evaluated each function 1 point (+). If the function is partially implemented (±), we evaluated it 0.5 points. We also did not take into our calculation the indicator of "`paid services`", as this function is not available to everyone. And we included a mobile version rating to take into account users' opinions.

We see that the most functional was found out the platform TheFreeDictionary. It has not only a wide range of educational functions but also the highest rating among users.

The lowest rating was found out in the dictionary of Glosbe, it has only 3 educational functions

– multilingual support, co-editing, and registration. According to table 1, you can see also that the rating of this platform is low.

4. Conclusions

One of the steps towards the digital transformation of education is to provide students with digital educational content and to provision digital interaction and cooperation between students and teachers. Platforms of online dictionaries are a means of organizing digital activities and student interaction. They provide both independent activities of students in the educational environment and collaborative activities by tools of online dictionaries.

In this paper, we have analyzed the 10 most popular online dictionaries. This analysis shows that each platform has traditional and additional tools that can implement certain educational functions in the study of a foreign language.

Nowadays, online dictionaries can not only help to improve the vocabulary but also increase the level of grammar, practice pronunciation, develop writing skills, and more. Thanks to the learning tools function, which most platforms have, students can implement the next types of English activities: listening, reading, writing.

Particularly useful for writing training is participation in co-writing articles (collaborative edit tools) and discussion topics (discussion tools).

The only exception of these activities is speech, which cannot be formed in an artificial environment like an online dictionary. This activity involves the presence of the person and the relevant language situation.

This article showed that online dictionaries differ in many aspects: purpose, tools, technological environment, levels of the structuring of interfaces, forms of information presentation, opportunities for registered users, etc. The analysis of the functions of online dictionaries makes it possible to track the combination of information and lexicography technologies in online interpretation. It promotes better orientation in modern English-language discourse, illustrates and explains the evolution of society, shows its linguistic realities in a particular time period. Described dictionaries can be both an additional and the main source of linguistic information offered during the study of foreign languages.

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