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Approaches to Criteria Development Evaluating Efficiency of Innovative Forms of Teaching a Foreign Language

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Abstract

The urgency of the problem under study is due to the intensive development of information technologies and their ubiquitous distribution, which had a significant impact on the educational system, the development of new teaching aids and forms of organization of the educational process, such as distance learning. The development of IT encourages educational organizations to use innovative forms of education, for example, the use of robots as teachers or their assistants. In this regard, there is the problem of developing universal criteria for evaluating the effectiveness of the educational process, organized using these tools. The purpose of the article is to develop universal criteria for evaluating the effectiveness of the process of learning a foreign language, which can be used for a comparative analysis of various innovative means and forms of education. The leading approach to the study of this issue is a survey of an expert group and an analysis of existing works on this topic. The article also presents the results of a comparative analysis using these criteria of three forms of education: training with the presence of a teacher, distance learning and training with the help of a robot teacher. As a result of the study, universal criteria were developed for evaluating the effectiveness of the process of learning a foreign language, each of which was provided with a weighting factor, which made it possible to correctly process the results of a comparative analysis of various innovative forms of education. Article materials can be useful for teachers of foreign languages and educational organizations.

Keywords: teaching English as a foreign language, information technologies in education, distance education, learning a language with the help of a robot, innovative forms of learning.

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Introduction

Learning English is included in the curricula of most universities in the world. Knowledge of English is important for professionals in all areas of professional activity. Thanks to the development and wide dissemination of information technologies, new means of teaching foreign languages have emerged, as well as new forms of organization of the educational process. Such innovations include distance learning and the use of robots as teachers or their assistants. In this regard, modern educational organizations are asking about the feasibility of using new technologies for learning and their effectiveness. Therefore, the actual issue is the development of universal criteria for evaluating effectiveness of the educational process and a comparative analysis of the effectiveness of these forms of education in relation to existing traditional ones based on these criteria.

The issue of developing criteria for evaluating the effectiveness of teaching foreign languages are covered in a significant number of research papers (Tambieva, 2011; Oparina, 2005a,b). However, the developed criteria are aimed at any one specific form of training. Oparina (2005a,b) considers only the use of "man-machine learning systems" and develops criteria for evaluating this particular form of education. Over the past decade, with the proliferation of distance learning, a number of studies (for example, Soleima, 2014) have appeared on the evaluation of effectiveness of distance learning. Also recently, thanks to the intensive development of the social robotics industry, research has emerged on the use of anthropomorphic robots in teaching English (Altin, Aabloo, & Anbarjafari, 2014; Han, 2012; Mubin, Shahid, & Bartneck, 2013; Jia, 2009; Kanero et al., 2018; Kennedy et al., 2016; Alemi et al., 2014, 2015). But even in these studies, narrowness of analysis is present, namely only the forms of training, including the use of robotics, are considered, while some comparison with other forms is omitted. So, You et al. (2006) in their study analyze several different methods of teaching a foreign language in cases where a teacher assists a robot. Thus, in all the above and other analyzed works there are no universal criteria for evaluating effectiveness of the learning process that can be applied to existing innovative and traditional forms of learning.

In this paper, a comparative analysis of the following forms of teaching English is conducted, namely a traditional lesson with the presence of a teacher, distance learning and learning with the help of a robot used on-line. To carry out the analysis it is necessary to develop criteria for evaluating effectiveness of the process of teaching English.

Methods

The paper uses the methods of analysis and processing of scientific works, which allow us to obtain a broader view of the issue and examine it from various angles. This makes it possible to develop criteria applicable to all existing forms of education. The method of interviewing experts is also used, which makes it possible to assess the significance of each of the criteria developed for the considered forms of education.

Results

As a result of research, analysis and processing of scientific papers, criteria were developed that allow an assessment of the effectiveness of the use of a particular form of education. Additionally, an expert group consisting of students and teachers was involved to assess the significance of each of the criteria. The weights of the criteria were obtained according to these estimates. Criteria and their weights are presented in Table 1.

CRITERIA FOR EVALUATING THE EFFICIENCY OF THE ORGANIZATION
TEACHING ENGLISH LANGUAGE

Table 1

	Criterion	Significance in points
	The possibility of teaching to understand conversational speech	100
	The possibility of teaching to understand artistic texts	100
	The possibility of teaching grammatical writing	100
	The possibility of teaching grammatically correct speech	100
	The possibility of teaching to understand technical texts	80
	Availability of monitoring of knowledge and skills using quantitative methods	50
	Availability of monitoring of knowledge, skills and abilities using qualitative methods	80
	A student-teacher feedback in the learning process	100
	The possibility of collective work of students	100
0	The stimulation of cognitive activity	100
1	The motivation to learn	100
2	Students' positive emotional reactions in the learning process	70
3	Protecting students from possible negative emotional reactions in the learning process	100
4	Organization of the educational process taking into account specific features of students	100
5	Mass availability	100

When evaluating each criterion, a number is assigned according to the following scale: 0 is not performed; 1 is partially performed; 2 is fully implemented.

A formula was derived that allows to calculate the assessment of the form of study:

$$K = \frac{\frac{1}{2}\sum_{i=1}^{n} s_i \cdot K_i}{\sum_{i=1}^{n} K_i} \cdot 100\%, \tag{1}$$

i is the number of the criterion, s_i is the evaluation of the criterion according to the above scale, K_i is the weight of the criterion.

The criteria in Table 1 are applied to four forms of study:

1. A lesson with a teacher.
2. Distance learning.
3. Teaching by an anthropomorphic robot teacher controlled by a teacher in telepresence mode.

In order to ensure objectivity of the assessment, these forms of education are compared under the condition of the identical content of the curriculum used in the training process.

The above forms of training were evaluated by a group of experts, which included 70 students and 30 teachers. The results of the evaluation of the above forms of training are displayed in the Table 2.

RESULTS OF EXPERT EVALUATION

Table 2

	Criterion	Lesson with a teacher	Distance learning	Lesson with a robot-teacher
	The possibility of teaching to understand conversational speech	2	2	2
	The possibility of teaching to understand artistic texts	2	2	2
	The possibility of learning literate writing	2	2	2
	The possibility of learning literate speech	2	2	2
	The possibility of learning to understand technical texts	2	2	2
	Availability of monitoring of knowledge and skills using quantitative methods	2	2	2
	Availability of monitoring of knowledge and skills using quality methods	2	1	2
	Feedback from the student to the teacher in the learning process	2	1	2
	The possibility of collective work of students	2	1	1

0	Stimulation of cognitive activity	2	1	1
1	Motivation to learn	2	2	2
2	Positive emotional student reactions in the learning process	1	0	2
3	Protecting students from possible negative emotional student reactions in the process of communication with the teacher	0	1	2
4	Organization of the educational process taking into account the individual characteristics of students	1	2	1
5	Mass availability	1	2	0

Table 3 shows the expert assessment of the effectiveness of the organization of the process of teaching English, calculated using formula 1. Teaching in the form of a lesson with a teacher received a higher appreciation of experts. However, two other forms of education also received high and practically equivalent assessments of experts, which suggest that new forms of education can also be highly effective.

EXPERT ASSESSMENT OF THE EFFECTIVENESS OF THE ORGANIZATION OF THE PROCESS OF TEACHING ENGLISH

Table 3

	Form of study	**Evaluation of the effectiveness of the organization of training**
	A lesson with a teacher	86%
	Distance learning	78%
	Lesson with a robot-teacher	76%

Discussion

It is well known that a class-lesson system of education is the predominant organization of the learning process in modern education, in which to conduct lessons, students of the same age are grouped into small groups (classes) that remain their membership for a fixed period of time (usually it is a school year), and, all students work on mastering the same material.

The main features of the class-lesson system of education are the following:

- all members of the study group learn the same topic, the same questions at the same time, in the same way;

- learning content is divided into highly specialized subjects, and each subject is studied separately;

- students are divided into classes – study groups, constant in membership, single-level (in the sense of studying the program); hence the single-level (even-age) classes appeared;

- for all members of a group (class) the same sequence of studying topics and sections of an academic subject is determined;

- according to the nature of the activity, two different groups of people are distinguished: one only trains (teachers), others only learn (pupils);

- the study of a certain academic subject is organized in one "language" for all members of the class;

- the common for all members of the group are the beginning and end of classes, the number, duration and time of rest breaks (Mkrtchyan, 2010).

In this case, the main form of education in the class-lesson system is a lesson.

Distance learning is the interaction of a teacher and students between themselves at a distance, reflecting all the components inherent in the educational process (goals, content, methods, organizational forms, teaching aids) and implemented by specific Internet technologies or other means involving interactivity (Polat, Bukharkina, & Moiseeva, 2004). Distance learning is an independent form of learning, information technologies in distance learning are the leading means.

Teaching by an anthropomorphic robot teacher controlled by a teacher on-line implies conducting a lesson within the class-lesson system. The teacher controls the robot remotely. Teaching with an autonomous robot-teacher also implies conducting a lesson within the class-lesson system; one of the teacher's functions is performed using a special program that controls all the actions of a robot. The teacher controls the robot remotely.

Conclusion

This paper proposes a system of criteria for evaluating new forms of education that appear with the development of innovative technologies. The proposed system takes into account all significant aspects of the learning process. It is universal and can be applied to any foreign languages and forms of education. The results of the application of this system of criteria to the three forms of education: a lesson with a teacher, distance learning, learning by a robot-teacher showed a higher efficiency of the traditional lesson, however, it is worth noting significant levels of efficiency of the other two forms.

References

Alemi, M., Meghdari, A., & Ghazisaedy, M. (2014*) Employing Humanoid Robots for Teaching English Language in Iranian Junior High-Schools.* Retrieved from: https://www.researchgate.net/publication/265509135_Employing_Humanoid_Robots_for_Teaching_English_Language_in_Iranian_Junior_High-Schools

Alemi, M., Meghdari, A., Mahboub B. N., & Taheri, A. (2015).*The Effect of Applying Humanoid Robots as Teacher Assistants to Help Iranian Autistic Pupils Learn English as a Foreign Language*. Retrieved from https://www.researchgate.net/publication/283255362_The_Effect_of_Applying_Humanoid_Robots_as_Teacher_Assistants_to_Help_Iranian_Autistic_Pupils_Learn_English_as_a_Foreign_Language

Altin, H., Aabloo, A., & Anbarjafari G. (2014). *New Era for Educational Robotics: Replacing Teachers with a Robotic System to Teach Alphabet Writing*. Paper presented at the 4th International Workshop Teaching Robotics, Teaching with Robotics & 5th International Conference Robotics in Education, Padova, Italy.

Han, J. (2012). Emerging technologies robot assisted language learning. *Language Learning & Technology, 16*, 1-9.

Jia, J. (2009). *An AI Framework to Teach English as a Foreign Language: CSIEC*. Retrieved from https://pdfs.semanticscholar.org/bd22/53155d2177f74399b877703d2aa421a9300c.pdf

Kanero, J., Geckin, V., Oranç, C., Mamus, E., Küntay, A., & Goksun, T. (2018). *Social Robots for Early Language Learning: Current Evidence and Future Directions.* Retrieved from: https://www.researchgate.net/publication/322359960_Social_Robots_for_Early_Language_Learning_Current_Evidence_and_Future_Directions

Kennedy, J., Baxter, P., Senft, E., & Belpaeme, T. (2016) *Social Robot Tutoring for Child Second Language Learning*. Retrieved from https://www.researchgate.net/publication/297710634_Social_Robot_Tutoring_for_Child_Second_Language_Learning

Mkrtchyan, M. A. (2010). *Stanovlenie kollektivnogo sposoba obucheniya: monografiya* [Formation of the collective method of learning: monograph]. Retrieved from https://elibrary.ru/item.asp?id=20123472

Mubin, O., Shahid, S., & Bartneck, C. (2013). Robot Assisted Language Learning through Games: A Comparison of Two Case Studies. *Australian Journal of Intelligent Information Processing Systems, 13*(3), 9-14.

Oparina, N. M. (2005a). *Integral'naya otsenka effektivnosti cheloveko-mashinnykh sistem obucheniya i vybor ratsional'nogo varianta organizatsii podgotovki spetsialistov s ikh ispol'zovaniem* [Integrated assessment of the effectiveness of human-machine learning systems and the choice of rational options for the organization of training with their use]. Khabarovsk: DVGUPS.

Oparina, N. M. (2005b). *Metod opredeleniya effektivnosti cheloveko-orientirovannykh sistem obucheniya pri chetkom kachestvennom vneshnem otnoshenii predpochteniya* [Method for determining the effectiveness of human-oriented learning systems with a clear qualitative external preference]. *Izvestiya SPbGETU LETI, 9*, 15-28.

Polat, E. S., Bukharkina, M. Yu., & Moiseeva, M. V. (2004). *Teoriya i praktika distantsionnogo obucheniya: Uchebnoye posobie dlya studentov vysshyh pedagogicheskyh uchebnyh zavedenii* [Theory and practice of distance learning: Textbook for students of higher educational institutions]. Moscow: Akademiya.

Soleima, H. Kh. (2014). *Cistema kachestva rezul'tatov obucheniya studentov, poluchayushchikh distantsionnoe obrazovanie v Irane i Rossii* [Quality system of academic results of students receiving distance education in Iran and Russia]. *Sovremennye problemy nauki i obrazovaniya, 6*, 9-11.

Tambieva, S. I. (2011). *Otsenki effektivnosti ispol'zovaniya IKT v protsesse obucheniya inostrannomu yazyku* [Evaluation of the effectiveness of ICT use in the process of learning a foreign language]. *Obrazovanie. Nauka i innovatsii: Yuzhnoe izmerenie, 3*(18), 177–182.

You, Z.-J., Shen, C.-Y., & Chang, C.-W., Liu, B.-J., & Chen, G.-D. (2006). *A Robot as a Teaching Assistant in English Class*. Retrieved from https://www.researchgate.net/publication/224638612_A_Robot_as_a_Teaching_Assistant_in_an_English_Class