Proceedings of IYSC, (2022), vol. 11

Journal homepage: http://journals.sdu.edu.kz/index.php/iysw

2022 International Young Scholars' Conference

CYRILLIC HANDWRITTEN OPTICAL CHARACTER RECOGNITION: A REVIEW OF VARIOUS RECOGNITION METHODS

M. Kalken[1], R. Jantayev[2]

[1,2]*Suleyman Demirel University, Kaskelen, Kazakhstan*

Abstract

In the age of digital technologies, to simplify the search and storage of information, the translation of handwritten documents into electronic format is an urgent task. Optical character recognition makes it possible to recognize characters from images and scans of documents with subsequent translation into a machine-readable format. At the moment, there are a lot of methods and algorithms of machine learning and computer vision that differ from each other in efficiency and method of application. In many ways, the results of the methods used differ due to the specifics of each language under study, expressed in the difference in the number and type of symbols. The purpose of this review article is to summarize the research conducted in recognizing handwritten Cyrillic characters and to conduct comparative results on methods and their results. As the data under study, we summarized and analyzed research articles on the topic of recognition of Cyrillic handwritten text.

Keywords: OCR, Handwritten Text Recognition, Machine Learning, Neural Networks, CNN.

Handwritten text recognition (HTR), due to its increasing significance and the enthusiasm of many scholars, is gaining traction in academic research. In the current digital era, HTR is in high demand in the business sector and is used to convert paper data to digital media, both online and offline[1]. Bank checks, medical paperwork, and postal documents are examples of source documents, while scanned or picture documents in image format are the major source for offline text translation into digital format [2]. All of this necessitates the development of curpnomastable HTR systems that can work with a huge number of documents in many languages. As with any business, there are issues associated with the fact that the qualities of handwritten words vary depending on the author and linguistic peculiarities such as slanted and rounded characters, diacritical marks, transverse stripes, and curved letters.

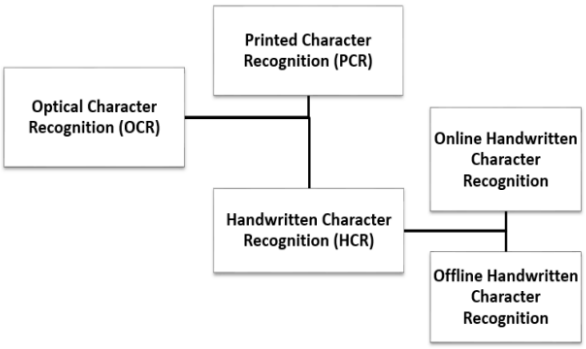


Figure 1. Optical Character Recognition Classification [3].

The success of the handwriting recognition system is determined by the precision with which characters of varying complexity are detected and, therefore, the rate at which the most suitable words are discovered. In recent years, the discipline of deep learning has achieved excellent achievements in the field of optical character recognition, and several approaches have shown to be very successful for a variety of tasks, including picture classification, object identification, and pattern recognition [4]. The study area is handwriting recognition, which has made tremendous progress and has not been abandoned. As a result of the use of Convolutional Recurrent Neural Networks (CRNN) [7]-[9], more effective optical recognition models have been found. These networks use convolutional layers responsible for object extraction from text pictures. Then, the extraction result is fed to repeated layers that propagate and decode objects using Connectionist Time Classification (CTC), which leads to the final results. The CNN contains a Long-term Short-Term Memory (STM) that is often utilized as a sequence decoder. In the future, several new techniques, such as Multidimensional LSTM (MDLSTM), have been developed to enhance the accuracy of this decoder [10], therefore increasing the possibilities of Recurrent Neural Network (RNN) architectures for multidimensional input. Despite the fact that MDLSTM [5, 7] is ineffectual owing to its computing expense and complexity, fresh research [6] propose simpler optical models. One of these models is the Bidirectional Long-Term Short-Term Memory (BLSTM) [10]. This model's findings are comparable to MDLSTM. Although the outcomes of such designs seem to be promising, optical recognition models have trouble remembering lengthy contexts. This is a result of difficulties with disappearing slopes. In addition, these models incorporate millions of trainable parameters to improve performance. Consequently, many real-world applications find it difficult to implement them [10].

In this paper, we propose a study of classification issues in handwritten input images of

Cyrillic letters by analyzing and comparing previous research on the subject. This study is a useful resource for researchers doing study in this area. The article investigates, analyzes, and substantiates many approaches of deep learning, including those used in the area of Cyrillic handwriting recognition. The structure of the document is as follows: In Section 2, the relevant works in the area of handwritten Cyrillic OCR is presented. In order to establish an effective and accurate OCR system, Section 3 outlines and examines the existing position and future developments. Section 4 contains the conclusion.

Literature Survey

Narankhuu Natsagdorj et al. [11] proposed Mongolian handwriting recognition using CNN model LeNet-5 with 7 layers. The authors used a database that contains handwritten characters of the Mongolian language in the form of individual letters. As a result, there are 24 letters that have about 300 repetitions. To get a variety as a result, the authors also changed the size of the image from 32x32 to 20x20. Three different iteration quantities were also used, these are 300, 500 and 1000. As a result, the result estimated in the prediction error showed approximately 2.9% rate of error. The rate in error was calculated for each letter separately. The similarity of letters in writing such as "O" and "B" was emphasized.

Kostiantyn Liepieshov et al. [12] in their work "On recognition of Cyrillic Text" proposed recognition of the handwritten Ukrainian language. Three types were chosen as the database: synthetic database, Cyrillic text in the wild and handwritten text. The method proposed by Jaderberg et al. was chosen as the collection of the first base. where UberText Corpus is supposed to be used. As a second database, the data was collected by the authors from the vastness of the Internet and contains about 500 images. As a handwriting database, the data was collected from the largest mathematical Olympiad in Ukraine and contains about 82,000 images. To test all these databases, the authors used a model that consists of 8 layers of a convolution neural network with different activation functions. After training and testing the model, measurement measures such as WER and CER were selected. For first and second base, the result was 59.8 and 29.6, respectively. For third base, 21.1 and 4.8 respectively.

Nazgul Toiganbaeva et al. [13] in their work proposed the first full-fledged database of the handwritten Kazakh language. Handwritten answers to exam questions of students from Satpayev and Al-Farabi universities were used to collect data. As a result, about 3 thousand images were scanned. Then the stage of processing and preprocessing was carried out, after which the authors

switched to image segmentation to achieve results in the form of separate words in each image. Further, work was done to collect truth tables for each word, for this purpose about 600 volunteers in the form of students and teachers were involved by answering questions through the telegram messenger. As a result, the database consists of about 140 thousand images with 922 thousand characters, of which about 95% of the words of the Kazakh language and 5% of the words of the Russian language. After that, the authors conducted training and testing of recurrent neural network models such as Bluche, Flor, Puigcerver and Abdallah to check the quality of the database. The results were measured in CER, WER and SER. the best result was shown by the Flor model with indicators of 6.52%, 24.52% and 26.98%, respectively.

Daniyar Nurseitov et al. [14] also offered to work on collecting a database of Cyrillic characters, but unlike the previous work, the database mainly consists of the names of cities and words of the Russian language. The database was collected by drawing up forms to fill out and about 200 volunteers were involved. Each of them filled out the form 4-5 times, as a result, about 1400 forms were collected. As a result, the forms contain about 106 thousand words and about 715 thousand characters. After this procedure, the authors carried out labeling and segmentation with further collection of truth tables.

Ruslan Jantayev et al. [15] proposed works on recognizing entire pages of handwritten Kazakh using the start, follow and read method. To achieve this goal, the authors also used their own database collected by scanning handwritten entries of university students. About 40 students were involved and about 400 pages of handwriting were collected. As a result, the number of words amounted to about 70,000 Kazakh handwritten words. The base was divided into 90% and 10% for training and testing, respectively. Since recognition is performed using a full page, the authors used the method of finding the beginning of the text, moving through the text and recognizing the text at the same time. The cut-off architecture of VGG-19 began as a start method. Further, the CNN model with 7 layers was used to follow method. The CNN-LSTM HWR architecture was used to recognize the text as read method. To test the model, the test part was divided into two parts, each of which, by CER standards, showed a result of 11% and 13%, respectively.

Abdelrahman Saleh et al. [16] proposed handwriting recognition of the Russian language using the Attention-Gated-CNN-BGRU model. The model has a deep beam structure unlike many well-known models. The database described earlier in the previous work, the HKR database, was

chosen as the database. It was divided into three parts, the first for training the model, the second and the third for testing. After completion of training and testing, the model results in the form of CER, WAR and STAR in 4.13%, 18.91% and 25.72%. Which is superior in results to other models like Bluche. Also, to compare and verify the proposed model, a test was conducted using other well-known databases such as IAM, Saintgall, Washington and Bentham. As a result, the model surpassed many other well-known models in the ratio of errors per character and word.

Daniyar Nurseitov et al. [17] proposed a comparison of different models using databases with the names of cities. Deep CNN, HTR, Bluche and Puigcerver were chosen as models. The HKR database was also taken as a database. As a result, the HTR model showed a result in the form of CER 15.78%, the Bluche model in the form of 10.15% and the puigcerver model in the form of 54.75%.

Discussion

Current research indicates that the recognition of handwritten Cyrillic text is a highly relevant topic, as databases containing handwritten text are just now being brought up to certain standards. Numerous works provide their own databases and do tests with them. In addition, the effectiveness and efficiency of recognition depend not only on the quality of the collected database, but also on the neural network model used. Varieties of well-known convolution networks are utilized in the majority of each study. For a more precise characterization and comparison of the work's outcomes, the following table takes into consideration models, databases, and test outcomes.

Table 1

Datasets and results of training different models of the studied literature

Reference	Dataset used	Architecture	CER	WER	Specificity
Narankhuu Natsagdorj et al.	Mongolian handwritten characters (7,200)	LeNet-5	2.9%	-	The database contains only individual letters.
Kostiantyn Liepieshov et al.	Ukrainian Cyrillic text in the wild (505), handwritten Cyrillic text (82,061)	7 layers of CNN	27.6% 4.8%	59.8% 21.1%	Used for the development of the new system for processing responses of participants of one of the largest math competitions in Ukraine.
Nazgul Toiganbaeva et al	Kazakh offline handwritten text dataset (140,335)	Flor Puigcerver Abdallah Bluche	6.52% 8.01% 8.22% 8.36%	24.52% 26.34% 22.60% 28.95%	A very large database of 95% of the Kazakh language has been collected and used.
Daniyar Nurseitov et al.	Handwritten Kazakh Russian (64,943)	-	-	-	In the work, the main goal was to collect a database without further testing.
Ruslan Jantayev et al.	Kazakh handwritten dataset (70,000)	Start, follow and read method	11% 13%	-	The model reads and digitizes the full page.
Abdelrahman Saleh et al.	HKR (64,943)	Attention-Gated-CNN-BGRU	4.13% 6.31%	18.91% 23.69%	A deep model with many parameters is used.
Daniyar Nurseitov et al.	HKR (64,943)	Deep CNN HTR Bluche Puigcerver	- 15.78% 10.15% 54.75%	- 25.89% 37.49% 82.91%	Different models with different structures were used by comparing the results.

Table 1 illustrates the relationship between the various databases and models utilized to produce recognition results. And currently, according to the work of Abdelrahman Saleh et al. utilizing the HKR database and the Attention-Gated-CNN-BGRU model, has the best outcome indicator in the form of 4.13 percent CER and 18.91 percent WER. Each work has its own particulars and distinctions. With these accomplishments, we can observe the growing interest of scholars in this field and the continuous improvement of handwritten Cyrillic character recognition.

Conclusion

The recognition of handwritten Cyrillic text is a highly relevant topic, as databases containing handwritten text are just now being brought up to certain standards. The effectiveness and efficiency of recognition depend not only on the quality of the collected database, but also on the neural network model used. This survey reveals that the majority of researchers recommend using CNN. CNN-based models are well suited for image identification tasks and particularly outperform all other models. Additionally, the accuracy rate depends not only on CNN architecture, but also on the dataset and pre-processing techniques used. The subsequent phase would include the development of a highly accurate automated system. After developing an accurate OCR, it will assist not only the general populace but also the financial and government sectors of CIS nations. A significant effort was made to promote the Russian and Kazakh languages by collecting huge, publicly accessible databases. This will play a significant role in the promotion of machine learning models to enhance recognition outcomes. Consequently, it is now necessary to gather and standardize databases of other Cyrillic languages.

References

1. R. Reeve Ingle. et. al., A Scalable Handwritten Text Recognition System, IEEE Trans. Pattern Anal. Mountain View, CA 94043, USA, 2019.

2. Tsochatzidis L, Symeonidis S, Papazoglou A, Pratikakis I. HTR for Greek Historical Handwritten Documents. J Imaging. 2021.

3. Phillip Benjamin Ströbel. et. al., Fink G.A., Evaluation of HTR models without Ground Truth Material, University of Zurich, University of Bern), 2022.

4. Chieh-Chi Kao. et. al., R-CRNN: Region-based Convolutional Recurrent Neural Network for Audio Event Detection, Amazon Alexa, 2019.

5. Xinyu Fu et. al., CRNN: A Joint Neural Network for Redundancy Detection, Solution Architect and Engineering Asia Pacfic and Japan, Nvidia, 2017.

6. Baoguang Shi et al, An End-to-End Trainable Neural Network for Image-based Sequence Recognition and Its Huazhong University of Science and Technology, 2015.

7. Alex Sherstinsky et al. Fundamentals of Recurrent Neural Network (RNN) and Long Short-Term Memory (LSTM) Network, Physica D: Nonlinear Phenomena, 2018.

8. Has¸im Sak, et. al. Long Short-Term Memory Recurrent Neural Network Architectures for Large Scale Acoustic Modeling, Google, USA, 2018.

9. Haowei Jiang et. al., Recurrent Neural Network from Adder's Perspective: Carry-lookahead RNN. Whiting School of Engineering, 2021.

10. Ralf C. Staudemeyer et. al., Understanding LSTM – a tutorial into Long Short-Term Memory Recurrent Neural Networks Last accessed November, Schmalkalden University of Applied Sciences, 2019.

11. Narankhuu Natsagdorj, Mongolian Handwriting Character Recognition Based On Convolutional Neural Network(CNN), 6th International Conference on Information Engineering for Mechanics and Materials, 2016.

12. Kostiantyn Liepieshov, Oles Dobosevych, On recognition of Cyrillic Text, 2019.

13. Nazgul Toiganbayevaa, Mahmoud Kasemc, Galymzhan Abdimanap, et al. KOHTD: Kazakh Offline Handwritten Text Dataset, 2021.

14. Daniyar Nurseitov, Kairat Bostanbekov, Daniyar Kurmankhojayev, Anel Alimova, Abdelrahman Abdallah, HKR For Handwritten Kazakh & Russian Database, Multimedia Tools and Applications, 2021.

15. Ruslan Jantayev, Shirali Kadyrov, Yedilkhan Amirgaliyev, Complete Kazakh Handwritten Page Recognition Using Start, Follow And Read method, Journal of Theoretical and Applied Information Technology, 2021.

16. Abdelrahman Abdallah, Mohamed Hamada and Daniyar Nurseitov, Attention-Based Fully Gated CNN-BGRU for Russian Handwritten Text, Journal of Imaging, 2020

17. Daniyar Nurseitov, Kairat Bostanbekov, Maksat Kanatov, Anel Alimova, Abdelrahman Abdallah, Galymzhan Abdimanap, Classification Of Handwritten Names Of Cities And Handwritten Text Recognition Using Various Deep Learning Models, Advances in Science, Technology and Engineering Systems Journal, 2020.

Proceedings of IYSC, (2022), vol. 11

Journal homepage: http://journals.sdu.edu.kz/index.php/iysw

DEVELOPMENT AND ANALYSIS OF THE CAR REGISTRATION PLATE RECOGNITION SYSTEM

N. Yerzhanov[1], M. Murzabulatov[2]

[1]*Suleyman Demirel University, Kaskelen, Kazakhstan*

[2]*Nazarbaev University, Nur-Sultan, Kazakhstan*

Abstract

The main goal of this project is to create and test novel algorithms for detecting, segmenting, and classifying symbols in order to improve the performance of automatic recognition systems for automobile license plates based on neural networks under interference and distortion situations. The goal of this study is to look at the detection, segmentation, and classification techniques that are used to find objects in halftone and color photographs. The goal of the study is to increase the efficiency of video recording systems and vehicle traffic control by developing and modifying algorithms.

Introduction

The massive acceptance of information technologies in various aspects of human existence has characterized recent decades. We can solve the problem of improving traffic safety and the road situation by implementing and using intelligent transportation technologies. They usually consist of a collection of interconnected functional systems, such as systems for collecting data from traffic detectors and television cameras. The methodologies employed in their development may differ substantially because to the wide range of external situations in which these systems must operate. However, the majority of today's systems are made up of two basic components: picture collection and subsequent analysis, the latter of which is primarily controlled by the quality of the images collected. There are two basic ways to picture collection that may be recognized at this level in the development of car number recognition systems:

- the use of video capture devices for analog cameras directly in the computer. The disadvantage of such systems is the hardware limitation on the number of connected cameras and low frame resolution;
- the use of IP video cameras equipped with a CCD or CMOS sensor of photosensitive elements. A distinctive feature of this type of systems is the use of high-performance embedded components in them, such as microcontrollers and digital signal processors. In fact, each camera is a separate computer with an operating system installed and an application running for compressing, encoding and broadcasting a video stream.

At the first stage, the image obtained from the matrix is compressed using frame-by-frame (JPG) or streaming (H.264) encoding methods. The advantage of such a system is the high resolution of the video sequence.

There are a variety of external elements that alter the quality of a digital image, in addition to technological factors, such as the lighting of the surrounding scene, the movement of objects inside it, and etc. As a result, in order to achieve high accuracy in text character recognition on a car registration plate, algorithms must be developed that allow for the detection, segmentation, and recognition of text characters in the presence of noise, low image sharpness and contrast, erroneous white balance, and other interference in the field of digital image processing.

Nowadays, the building of video recording systems and automobile license plate identification systems has made great progress. However, owing to the usage of fixed parameters for the size and location of the item in the frame, there are unsolved issues in the transition to a higher resolution of the input video sequence. There is a class of jobs where simplicity of the license plate recognition system's operational circumstances becomes particularly critical, such as vehicle monitoring and control.

According to a review of recent scientific and technological literature, techniques based on are one of the most promising ways for recognizing text characters in digital pictures.
identification of key features or special points on the digital image;
calculating descriptors of areas of interest;
combined use of these two approaches.

The research for algorithms that perform without using a priori information about an object's features and allow finding the registration mark in the presence of interference on television pictures remains crucial for object identification jobs. As a result, at this point in science and technology development, developing and analyzing algorithms for recognizing, segmenting, and classifying symbols is a critical endeavor.

Methods

The general scheme of an automated system for recognizing text characters in a digital image.

Modern methods of digital image processing, computer vision, pattern recognition, mathematical analysis, probability theory and mathematical statistics were used to solve the tasks. For the practical implementation of algorithms, modern numerical methods, methods of programming in MatLab and methods of object-oriented programming in C++ were used.

The main design of an automated system for identifying text characters in a digital picture is presented in this paper. The following are the primary components of this system.

Image formation. The image received from the video camera is sent to the system input for further processing and analysis. This operation is of crucial importance, and the operability of the entire system as a whole depends on the hardware and software used at this stage.

License plate detection. It is used to detect objects of interest - numbered plates for the purpose of their subsequent analysis.

License plate segmentation. At this stage, the detected license plate is divided into separate characters by constructing dividing lines between them based on the least important pixels for the purpose of further character recognition.

Classification of text symbols. The symbols segmented at the previous stage are divided into 21 classes, copies of which are numbers and letters of the English alphabet, acceptable for use on state automobile registration plates in the Republic of Kazakhstan. In the future, it is also planned to classify foreign car license plates.

The systematization, analysis, and application of a number of well-known methods for identifying text symbols on digital pictures, including:

template comparison algorithms and window functions;

correlation algorithms;

algorithms based on morphological processing and projection calculation;

1algorithms based on the calculation of descriptors and subsequent classification of objects.

This research refers to the creation, modification, and analysis of algorithms for detecting, segmenting, and recognizing text characters on a digital picture in the presence of distortions and interference induced by practical needs for automatic license plate recognition systems.

A new algorithm based on the detection of point features in digital images

The search for point characteristics on a license plate on a digital picture is the first step in picking a license plate. Angles are one of these characteristics. A Harris angle detector is utilized to do this.

Start by looking at a digital grayscale images picture, which represents a two-dimensional intensity function (x,y). Write the weighted sum of squares of the differences between two adjacent image sections I(u,v) and I(u+x,v+y) as follows:

$S(x,y) = \sum_u \sum_v w(u,v)\ [I(u,v) - I(u+x, v+y)]^2$,

Where $w(u,v) = \frac{1}{2\pi\sigma^2} e^{\frac{u^2+v^2}{2\sigma^2}}$ - a two-dimensional Gaussian window function used to

reduce the sensitivity of the algorithm to noise.

Within the local neighborhood of the pixel under study, the expression in square brackets can be approximated by the Taylor series:

$$I(u+x, v+y) \approx I(u,v) + \frac{\partial I}{\partial x}(u,v)x + \frac{\partial I}{\partial x}(u,v)y.$$

Substituting (2) into (1) and performing the approximation, we obtain in matrix form:

Where, $M(x,y) = \sum_u \sum_v w(u,v) \begin{bmatrix} I_x^2 & I_x I_y \\ I_x I_y & I_y^2 \end{bmatrix} = \begin{bmatrix} I_x^2 & I_x I_y \\ I_x I_y & I_y^2 \end{bmatrix}$ – the Harris matrix.

The point feature of the image is characterized by a large change in the magnitude of S(x,y) in all directions. How large its value is at a given point can be judged based on the analysis of the eigenvalues of the Harris matrix. Denote them α and β, then the value of S(x,y) will be proportional to each of them. In this case, one of the following cases will be implemented:

α ≈ 0 и β ≈ 0 - no local point singularity;

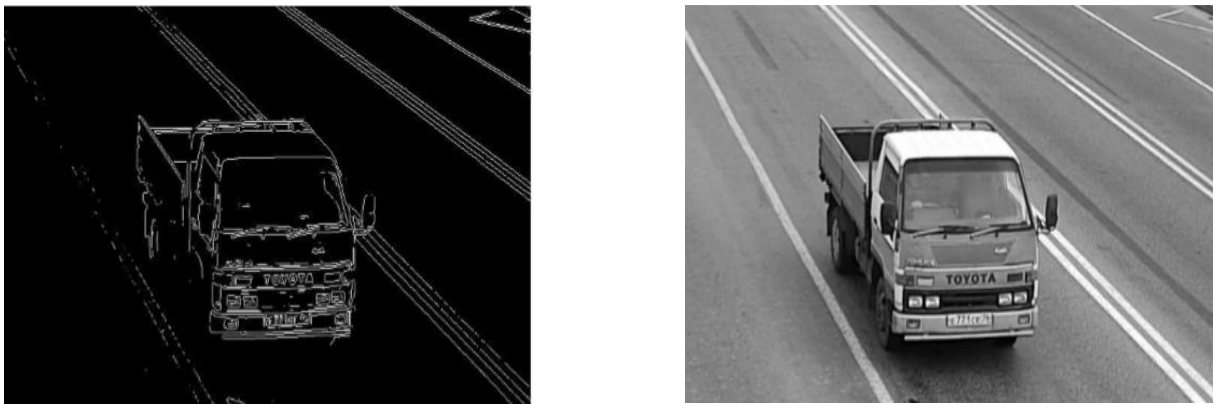
α ≈ 0, β is a sufficiently large positive number - the presence of the border of the object;

α and β are large positive numbers - detection of a local point feature of the "corner" type.

As a result, determining the eigenvalues of the Harris matrix is required to detect point objects in the picture. Instead of directly finding the values α and β, a response function of the form: can be generated due to the high computing cost of their calculation.

$$R = (\alpha\beta) - k(\alpha+\beta)^2 = \det(M) - k\, trace^2(M).$$

The k parameter in the formula is determined via trial and error. The Harris corner map is a two-dimensional function of pixel coordinates that serves as a response function. R has a positive value in the angle region, a negative value in the edge area, and a tiny value in areas of uniform intensity. A map of the Harris corners for the test picture is shown in Fig. 1a. After that, it passes through a threshold processing (binarization) technique to separate the bright pixels that belong to the areas of interest from the dark pixels that relate to the background.



b)

Fig 1. License plate detection

a) a map of Harris corners; b) areas of interest in the original image

The allocation of an area of interest among a set of connected areas is carried out on the basis of HOG(Histogram of oriented gradients) descriptors, the calculation scheme of which is illustrated in Fig. 2. First, the intensity fadient of the image is calculated, then it is divided into cells. Next, the value of the modulus of the gradient vector at this point in the image is assigned a weighted voice, which is summed with the values of other vectors in this direction. At the next stage, the cells are combined into larger blocks, their normalization and the final feature vector is obtained, which fully describes each area of interest. To solve the binary problem of choosing among all the obtained areas of interest of the numbered plate, an anomaly detector was used.

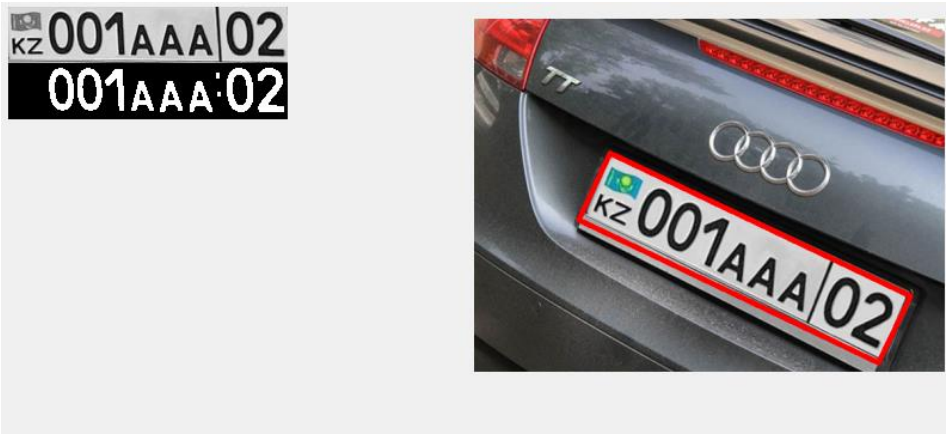
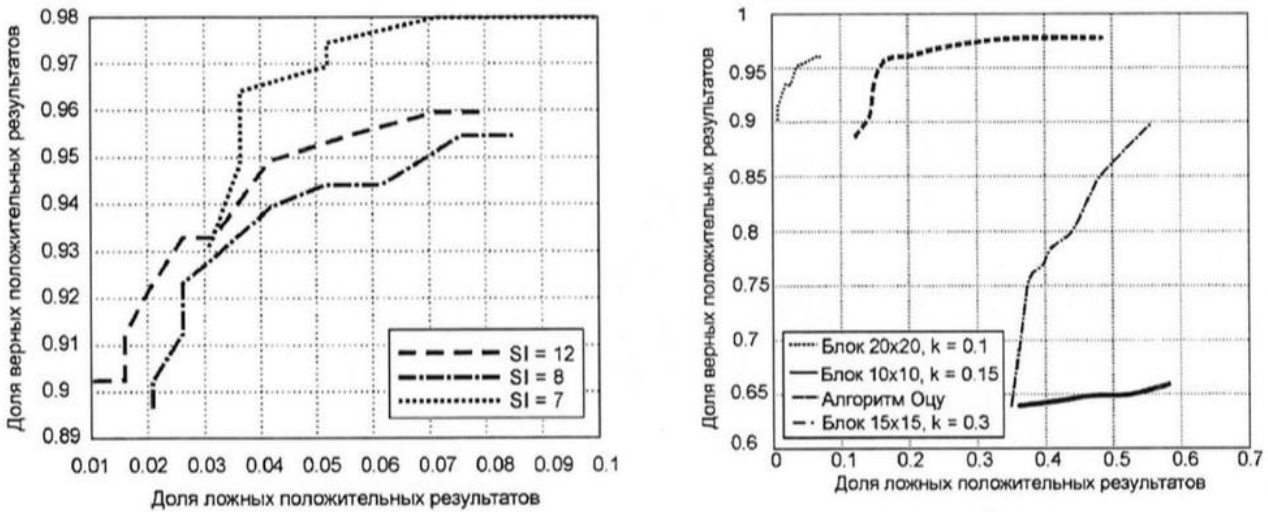


Fig. 2. Scheme of calculation of HOG descriptors

The analysis of the efficiency of the developed algorithm was carried out using the method

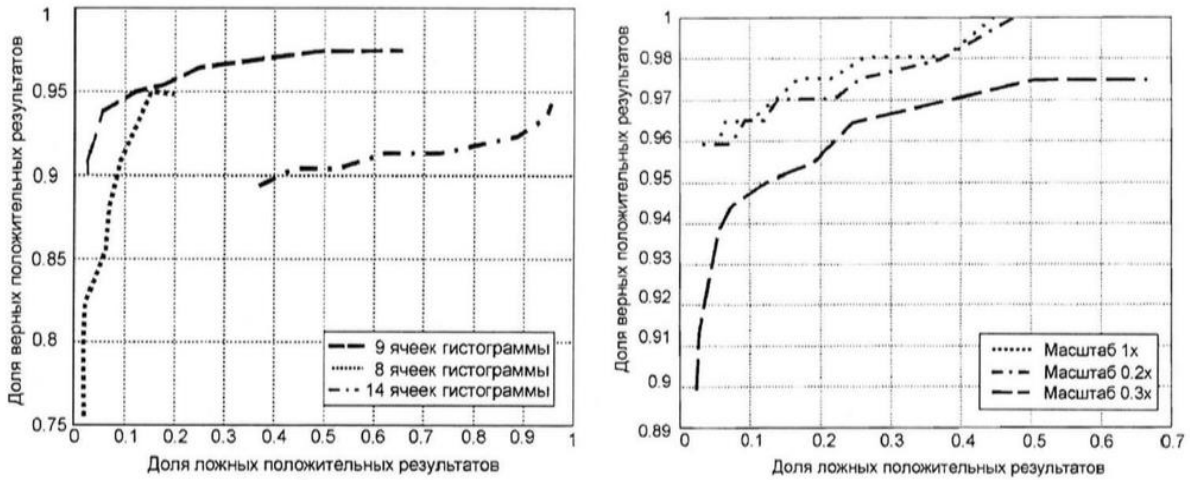
of ROC (Receiver operating characteristic) curves. The dependence of the number plate detection accuracy on various parameters of the algorithm operation is investigated (Fig. 3 and Fig. 4).



b)

Fig 3. Dependence of the number plate detection accuracy on:

a) the size of the angle detector neighborhood; b) binarization parameters



b)

Fig. 4. The dependence of the accuracy of the number plate detection on:

a) the number of cells in the histogram of the LEO descriptor; b) the scale of the images when training the anomaly detector

It is important to obtain a precise estimate of the license plate's location in addition to the

direct fact of detecting it. To do so, you must compare the automated algorithm's detection result with the reference markup (Fig. 5).

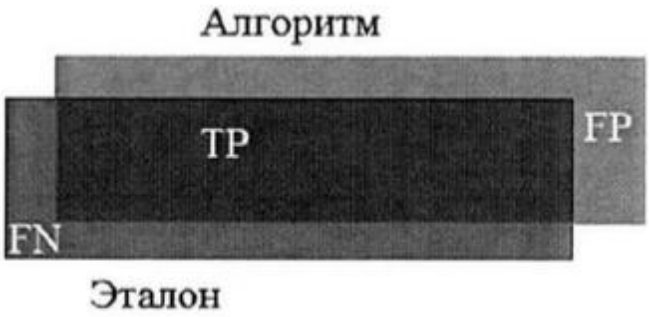
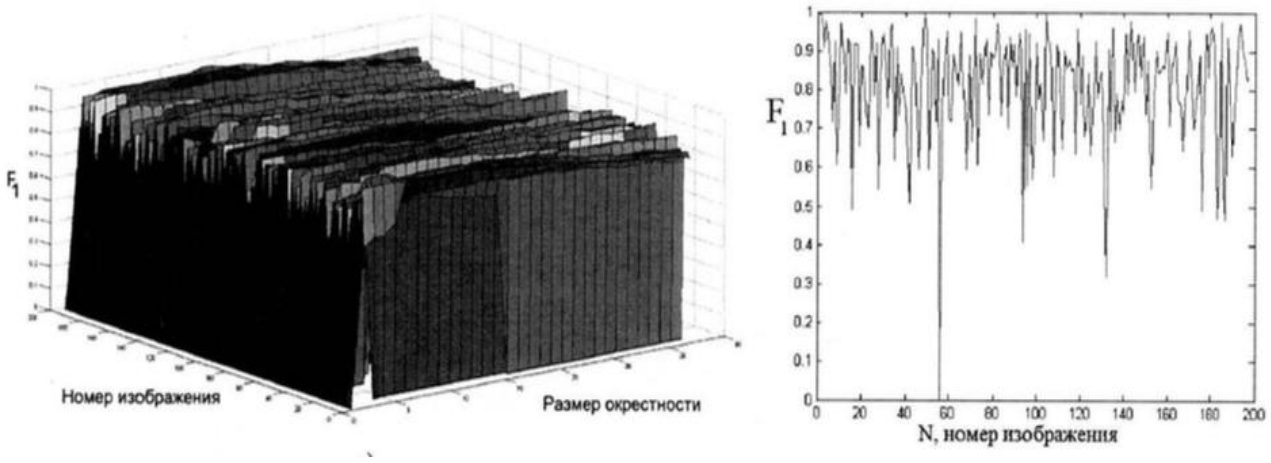


Fig. 5. Possible situations during detection

Thus, the accuracy of location determination will be as follows:

$$F_1 = \frac{2 * Precision * Recall}{Precision + Recall} = \frac{2 * TP}{2 * TP + FP + FN}$$

Figure 6a shows an example of the values of the F_1 function with one parameter of the algorithm under study and the others fixed.



b)

Fig. 6. Dependence of the value of F_1 on:

a) the size of the neighborhood of the Harris angle detector; b) image numbers of the test base

Figure 6b illustrates the relationship between the accuracy of recognizing F_1 in photos from the test database and the values of the internal parameters discovered earlier.

Segmentation algorithm of the previously detected number plate with the selection of the best parameters of its operation

The information content of the studied frame is taken into consideration by the algorithm. The key phases of the symbol segmentation procedure for the observed license plate are depicted in Figure 7. (Figure 7a).

The notion of a "cost function" is presented to determine the informative relevance of a pixel. This method returns a conditional value that indicates the importance of a certain pixel in the current picture. The structure and outlines of objects will be the most important aspects in the image while calculating it. They are visible on the gradient image:

$$e(I) = a \times \left|\frac{\partial I}{\partial x}\right| + b + \left|\frac{\partial I}{\partial y}\right|$$

Fig 7b.

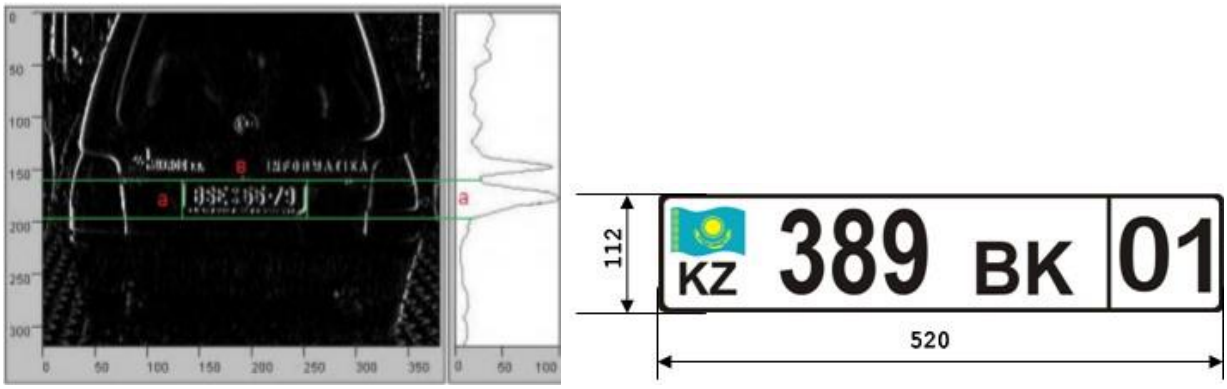


Fig. 7. Stages of the symbol segmentation algorithm:

a) the original image; b) gradient image; c) inheritance of pixel values;

d) a map of the cost of transitions; e) the energy accumulated in the last line;

f) formed lines of separation of characters

You must draw a dividing line between the characters based on the gradient picture. It is important to keep track of the state of pixel connection, which is used to divide pixels into segments. The picture is used to construct all passage pathways, which are 8-connected sets of pixels from top to bottom. The value of the least of its three predecessors, related pixels on the preceding line, is added to the current pixel value at each stage of the construction process (Fig.

7b). Obviously, the latter will include values that represent prior transitions (Fig. 7g). These aren't pixels anymore, but a cost function of probable transitions along the path S. (Fig. 7d).

Having a cost function $e(I)$, the cost of all such paths is calculated:

$$E(S) = E(I_s) \sum_{i=1}^{n} e(I(s_i))$$

The paths with the minimum cost are selected, which will be the dividing lines between the symbols:

$$s^* = min\, E(s) = min \sum_{i=1}^{n} e(I(s_i))$$

Such separation lines are shown in Fig. 7e. They are formed automatically and adaptively to the information content of the frame. Thus, the algorithm does not need a priori specification of the number format and is therefore more flexible.

When producing a gradient image, parameters a and b determine the optimal parameters of the algorithm, taking into consideration the fulfillment of the criterion of balance between sensitivity and specificity of the algorithm. The values of specificity and sensitivity are shown in Figure 8 as a function of the parameters *a* and *b*. These surfaces have common points that meet along specific curved generators, as can be observed. According to the criterion of sensitivity and specificity balancing, the produced intersection lines correspond to the optimal values of the algorithm parameters *a* and *b*.

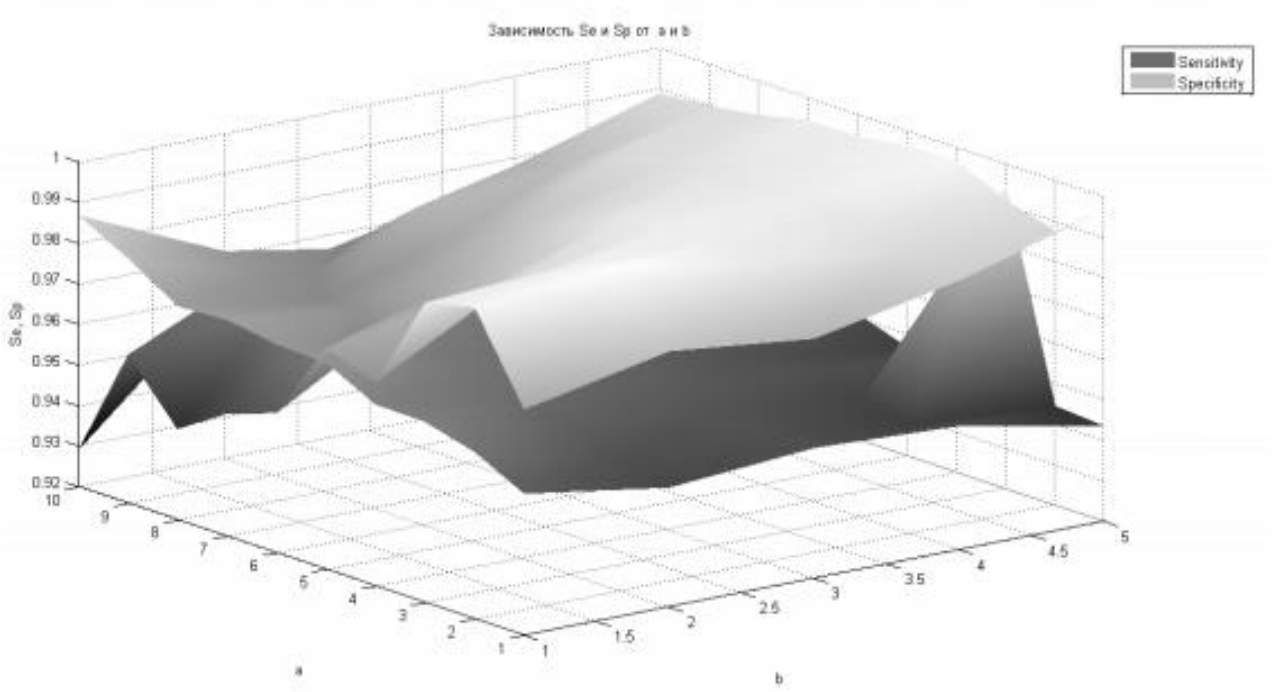


Fig. 8. Dependences of sensitivity and specificity on the parameters of the cost function

To correctly recognize a license plate, a simultaneous accurate classification of each symbol is required. Such an estimate for all images in the database has the following form:

$$S(a,b) = \sum_{j=1}^{N}\left(\prod_{i=1}^{k}\widetilde{P_{ij}}\right) = \sum_{j=1}^{N}(\prod_{i=1}^{k}(\alpha TP_{ij} + \beta FP_{ij} + \gamma FN_{ij}))$$

The resultant formula is an optimization objective function that describes the accuracy of the proper recognition of the whole license plate using the segmentation algorithm parameters. The maximum of this function will be reached at the point $[a_0, b_0] = argmax(S(a,b))$.

Thus, the values of the parameters of the cost function a and b are chosen based on the obtained dependencies, which are ideal in terms of accurate license plate recognition. At the same time, the most advantageous ratio between first and second-order mistakes has been accomplished, resulting in the most precise dividing line between neighboring symbols on the digital picture of the car's license plate.

Development and analysis of an algorithm for classifying text characters on a license plate

A limited Boltzmann machine is used to solve this problem. The probabilistic rule for

triggering neurons of this network has the form:

$$p_i = P(\Delta E_i) = \frac{1}{1 + e^{-\frac{\Delta E_i}{T}}}$$

Where p_i - the probability of finding the i-th neuron in the active state; $P(x)$ - sigmoid function; $T -$ parameter similar to temperature; $E = -\frac{1}{2}\sum_{i \neq j}\sum w_{ij} y_i y_j + \sum_i T_i y_i$ - an energy function that analyzes the state of a neural network.

the input picture is permanently attached to the input blocks;

the hidden and output blocks' states are randomized, and the temperature gradually drops;

At a low value of the parameter T, the status of the network is monitored, and statistics on the states of the output blocks are gathered. A conclusion regarding the input image is reached based on these statistics.

A novel approach for training and functioning of a neural network is suggested to operate with correlated data. To make implementation easier, all networks have the same probability values for transitioning neurons to the next state and the same rules of temperature change. The relationship matrices of networks differ from one another. If an unknown picture (SD) is fed into the trained algorithm, the system must make the proper branching choice at each iteration based on the patterns detected in the training sample. Figure 9 depicts the topology of the classifier utilized in the created method.

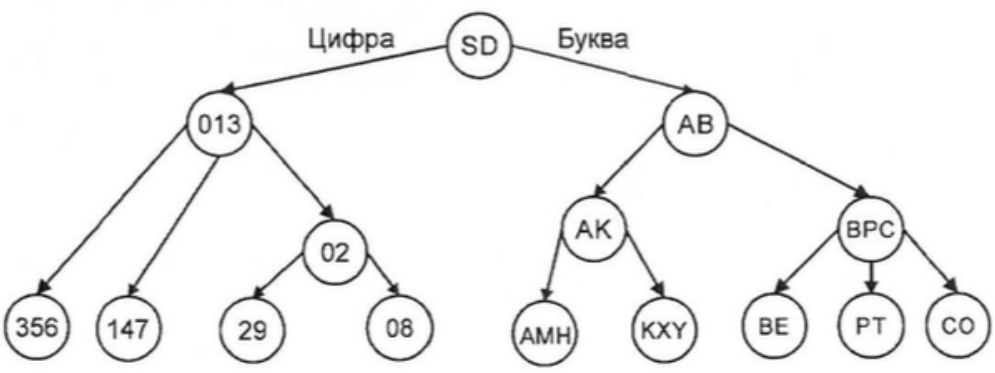


Fig. 9. Hierarchical tree structure of the classifier

The suggested text symbol classification algorithm is compared to two other methods for

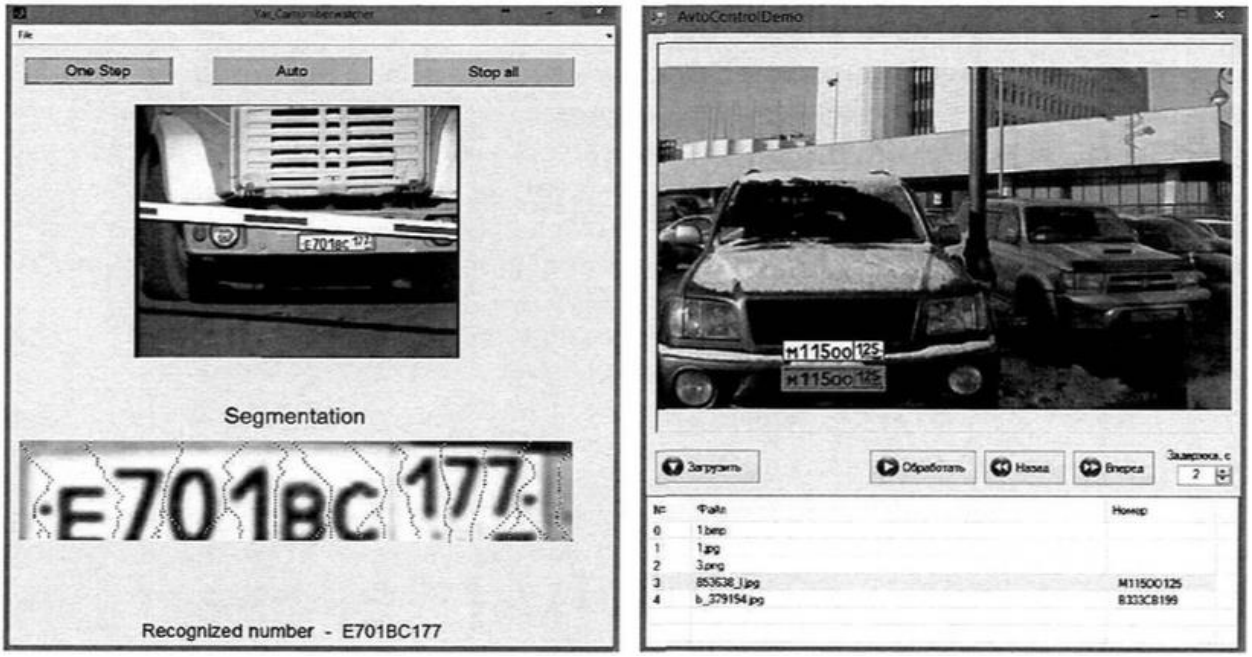
handling this problem: the traditional template technique and a method based on logistic regression and principal component analysis (AGC). The first uses a simple neural network with a sigmoid function as an activation function and AGC to reduce the dimension of the vector of features coming into the neural network's input. The second uses a simple neural network with a sigmoid function as an activation function and AGC to reduce the dimension of the vector of features coming into the neural network's input. Table 1 shows the outcomes of the work of the character classification algorithms under consideration.

Algorithms	Level of recognition
Template method	83%
Logit model	92%
Restricted Boltzmann machine	96%

Table 1. The probability of recognition in the absence of noise in test images

In the absence of noise, it can be shown that all algorithms have a reasonably high degree of accurate recognition. The approach based on a constrained Boltzmann machine, on the other hand, has the best indication. It is employed as a text character classifier.

The implementation of the established algorithms for text character detection, segmentation, and classification within the framework of a single Yar Camumberwatcher software environment is also examined in this chapter. This software package is also compared to Avto-Control Demo, its commercial equivalent. Figure 10 depicts the user interfaces for these apps.



b)

Fig. 10. Examples of automatic license plate recognition programs: Yar_Camumberwatcher; b) Auto-Control Demo

An original library of test pictures including 100 photos of various resolutions was created to compare the results of the Yar Camumberwatcher methods with the Avto-Control Demo algorithms. Images must be no more than 720x576 pixels in size, with text characters limited to 14-27 pixels in height.

Table 2 shows a comparison of the results of recognizing car registration plates on a test database of photos.

Algorithms	Level of recognition
Avto-Control Demo	95%
Yar Camumberwatcher	90%

Table 2. Comparison of frame-by-frame car license plate recognition programs

The Auto-Control Demo system has a greater level of character recognition than the planned Yarumberwatcher software, according to the findings of the comparison. This benefit, however, is owing to embedded algorithms' usage of a substantial quantity of a priori knowledge. As a result, if the number format or size of the original image is modified, as well as if the image

has distortions and interference, the recognition level of this application will be substantially lower. As a result, the Yar Camumberwatcher software is less affected by these shifts.

Results

Systematization, analysis and practical implementation of some well-known methods for solving problems of detection, segmentation and classification of text symbols on digital images in car registration number recognition systems has been carried out.

A multi-stage algorithm has been developed based on the detection of point features in digital images and allowing for the effective detection of vehicle registration numbers.

The suggested multi-stage method for recognizing automotive registration plates based on image point characteristics achieves a probability of proper detection of 97 percent, demonstrating its efficacy and competitiveness in comparison to similar recent techniques. The usage of a multi-stage data processing structure, on the other hand, increases the algorithm's computational complexity.

The main advantages of the proposed detection algorithm include the ability to process data in a more flexible manner thanks to a multi-stage scheme for identifying areas of interest, as well as independence from a priori knowledge of the license plate's properties such as size, aspect ratio, and so on.

A text character segmentation method has been created for digital photographs, which reads out the information content of the investigated frame.

Using the given algorithms for calculating the energy and cost functions, as well as the rules of passage for identifying the dividing lines between symbols, you may segment the license plate with a 97 percent chance of success.

The suggested segmentation algorithms' parameters have been tweaked based on visual and numerical character segmentation accuracy estimations.

The text symbol classification method for automobile registration plates has been enhanced, with a 96 percent right classification rate.

A commercial analogue is used to compare classification algorithms in the program to the job of identifying text characters on automobile registration plates. The created algorithms for recognizing, segmenting, and classifying automobile license plate symbols were implemented inside the framework of Yar Camumberwatcher, a single software environment for highway traffic monitoring. The suggested software package is compared to the Avto-Control Demo's commercial

counterpart. The Yar Camumberwatcher software has been proven to be the most successful in a wide range of number kinds.

The suggested methods achieve remarkable efficiency in circumstances where it is feasible to qualitatively compute the energy and cost functions when processing the local region of a correctly identified license plate on a digital picture. The processing of highly textured photographs is an example.

Conclusion

The following new scientific results were obtained as part of the dissertation work. A combined algorithm for detecting the license plate of a car based on machine learning and the search for point features in digital images has been developed. An algorithm for segmentation of text characters based on the calculation of the best parameters of energy and cost functions has been developed. A modification of the classification algorithm has been developed for use in the task of recognizing the symbols of car registration plates.

Practical significance of the results obtained:

A combined algorithm for detecting objects in digital images has been proposed, which has shown its effectiveness in the presence of distortion and interference.

An original algorithm for segmentation of text characters contained in the detected license plate has been developed, which allows expanding the number of types of recognized numbers.

The possibilities of practical application of classification algorithms in the case of determining the textual information of car license plates have been expanded.

The main scientific provisions and results submitted for defense

A combined algorithm for detecting objects of a given shape based on machine learning and the search for point features in digital images.

The algorithm of segmentation of text characters based on the calculation of the parameters of energy and cost functions.

Modification of the classification algorithm of text symbols for use in the task of recognizing automobile registration plates.

Reference

1. Volokhov V. A., Mochalov I. S., Priorov A. L., Sergeev E. V., Trapeznikov I. N. Yar_Camumberwatcher — a research program for recognizing automobile registration

plates on static images // Certificate of state registration of a computer program No. 2014615333 dated 05/26/2014.

2. Aminova. A., Noskov A. A., Trapeznikov I. N. PicFocus - a program for the formation of full-focus digital images // Certificate of registration of the computer program No 2014615039 state dated 05/15/2014.
3. Trapeznikov I. N. Application of signal processors for car number recognition tasks // Problems of information transmission and processing in telecommunications networks and systems: Materials of the 17th International Scientific and Technical Conference. conf. Ryazan. 2012.
4. Szeliski, "Computer vision: algorithms and applications", Springer, pp. 529–551, April 2010.
5. Shapiro L.G., Stockman G. "Computer vision", Prentice - Hall, 2001.
6. Martinsky O., "Algorithmic and mathematical principles of automatic number plate recognition systems", Brno University of Technology, 2007.
7. Bishop C.M., "Pattern recognition and machine learning", Springer, 2006.
8. K.M. Hung, C.T. Hsieh "A real-time Mobile Vehicle License Plate Detection and Recognition," Tamkang Journal of Science and Engineering, Vol. 13, No. 4, pp. 433-442, 2010.
9. Vapnik V.N., "Statistical learning theory," Wiley, 1998.

Proceedings of IYSC, (2022), vol. 11

Journal homepage: http://journals.sdu.edu.kz/index.php/iysw

IMPACT OF COVID-2019 ON THE ECONOMIC INDICATORS OF SMALL AND MEDIUM BUSINESSES

A.M. Nurpeiis

Suleyman Demirel University, Kaskelen, Kazakhstan

Annotation

Small and medium business is the backbone of the economy of any country. It provides employment for the economically active population, promotes innovation and diversification of industries. From the results of the survey that was conducted by ILO Score Programme, it was pointed out that micro, small, medium sized businesses (MSMEs) represents about 70% of global employment and about 50% of GDP. The quarantine measures introduced in the first half of 2020 have had an impact on the country's economy. In particular, it has had a significant impact on the success of small and medium-sized businesses. This article describes the economic performance of small and medium-sized businesses in Kazakhstan and the world before and during the pandemic.

Keywords: Enterprise, Covid-19, GDP, SMB, OECD, economic performance

Introduction

In OECD countries, medium-sized and small businesses represent the practical majority of the business community (90% or more of all business entities). Providing workers in some places with more than 70% of the population, SMEs are the main driving force in the economies of OECD countries. SMEs play a key role in providing economic development, being the main source of workplaces not only for qualified personnel but also what is important for more low-skilled persons from among the economically active population. According to official statistics, in July 2020, 1345.9 thousand SMEs were registered in Kazakhstan, which is 25.3 thousand more than in 2019 (1320.6 thousand).

When in January 2020, a global health emergency was declared due to rapidly increasing cases of coronavirus infection in China and in other countries, by the WHO Committee on Emergency Situations and included quarantine measures that were forced to stop almost all enterprises activities for an indefinite term. Since the beginning of 2020, the world is still experiencing the repercussion of the pandemic associated with COVID and its strains. After the decrease in cases of infection with the virus, companies have resumed their activities under strict conditions while observing quarantine measures. The corporate sector and SMEs suffered the most damage, as a result of the negative consequences of quarantine led to a decrease in economic activity. Thus, Covid-19 straightly affected the self-employed more than those employed by the company (Kritikos et al. 2020), as well as small businesses more than large ones (Dua et al. 2020)

either in Europe or the United States (Digitally Driven, 2020, 2021).

When almost all countries were suddenly closed for a total lockdown in early 2020, many companies did not have time to take action to continue their production. For instance, in the UK banks, railways, airlines, entertainment and etc. were on the brink of bankruptcy, not to mention laid-off workers and self-employed who lost everything due to the economic shock (Saad.2020). The activities of many organizations were suspended after the introduction of quarantine, as a result of which the flow of funds received decreased, organizations simply began to lose their profits. Expenses exceeded revenues, and the lack of profit led to a reduction in staff. Small and medium-sized businesses suffered significant losses, although governments subsidized the market and injected "recovery" funds as part of the aid package policy. It didn't help much, but it saved many from losing their jobs. Thus, the unemployment rate in the countries rose. According to official figures from the ILO (International Labor Organization), by autumn the number of unemployed in the United States amounted to 20 million people and 16 million in the European Union. Tourism, air travel, restaurants, oil companies - all these areas have been hit hard by the massive lockdown and the use of quarantine measures. The epidemic quickly spread around the world and caused a sharp decline in economic development, which led to a global recession.

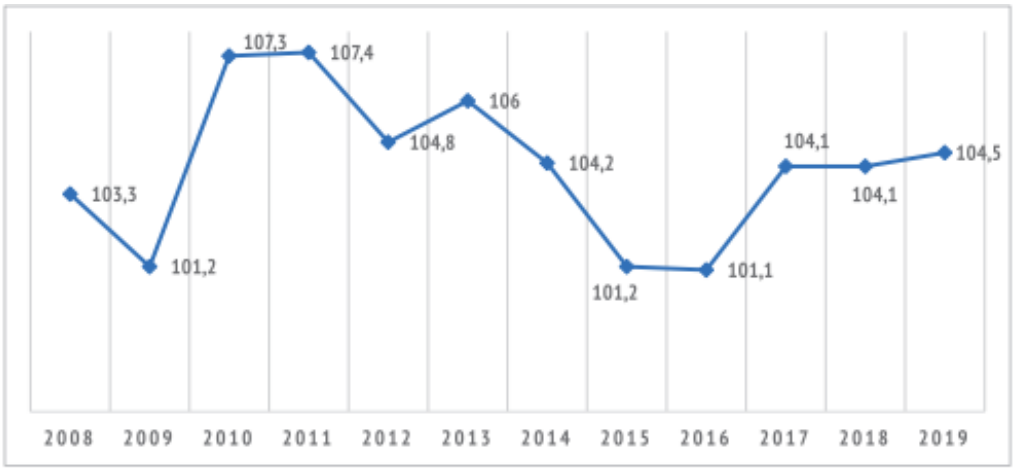
A research conducted by the Connected Commerce Council among more than 5,016 SMEs in Europe in November and December 2020 showed that almost all SMEs were impacted by the pandemic, including a reduction in sales by an average of 20% and in the customer base by 16% (Digitally Driven, 2021). Also Mentioning Graeber's study (2021) Women-owned small and medium-sized businesses are more likely to lose income by 35% than male-owned businesses, as there are more women working in industries that have been hit more severely by the pandemic COVID-19.

To get a clear vision of the scope and influence of the crisis on SMBs, there was conducted a survey by The Future of Business Survey with collaboration between Facebook, the Organisation for Economic Co-operation and Development (OECD) with the World Bank. The survey covered above 30,000 SMB owners, managers, and workers in over 50 countries and regions. According to the results of the survey, 26% informed that they shut down between January and May 2020 - over 50% in some countries like Bangladesh and Ireland. The significant effect came to Consumer-focused sectors. For instance, 54% of travel agencies and 47% of hotel and event organizing companies in the SME sector reported on the closure of their enterprises at the time of the survey.

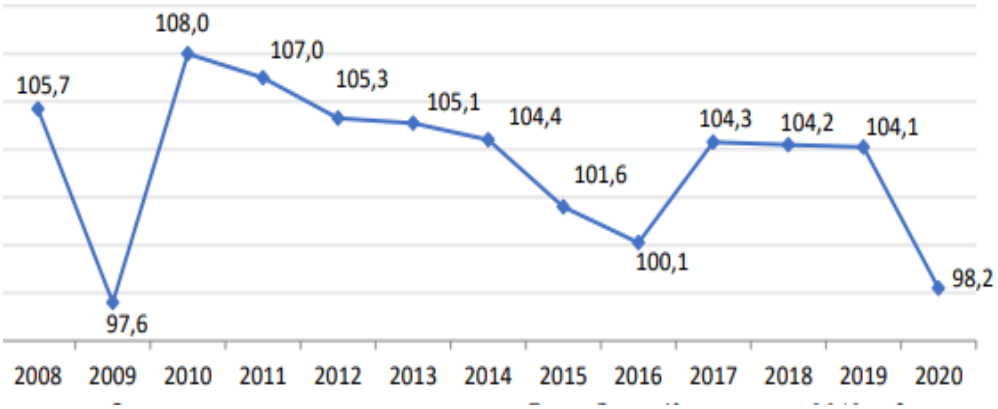
Also, SMEs run by one person defined as micro-businesses have closed down to a large extent than those with several workers. About 30% of micro-businesses replied being closed during the survey compared to 25% of SMEs with one or several employees. According to the results of the sample, in all countries, mass plant closures point to the month of March, after which governments introduced strict quarantine rules and social distancing. For example, in Peru, 63% of enterprises closed after self-isolation measures were introduced on March 16.

Taking the consideration that more than the past five years, in Kazakhstan, the SME sector has contributed an increasingly prominent role in the country's economy, the share of contribution to the gross domestic product (GDP) increased to 31% in 2019 against 28% a year earlier. According to the Bureau of National Statistics of the Republic of Kazakhstan, before the pandemic, 1.3 million small and medium-sized enterprises, including individual entrepreneurs (IEs), were registered in the country. Kazakhstan in the first half of 2020 decreased by 1.8%, decreased by 5.9 percentage points compared to the 1st half of 2019. The main factors behind the decline in the economy were the commissioning restrictive measures, as well as a reduction in production activity in the main sectors of the economy. One of the key indicators of the development of small and medium entrepreneurship in Kazakhstan is its share in the country's GDP.

In this article, we compared the reports of the economic performance of small and medium businesses in Kazakhstan in 2019 and in the first quarter of 2020 taken from reports of the National Chamber of Entrepreneurs Atameken.



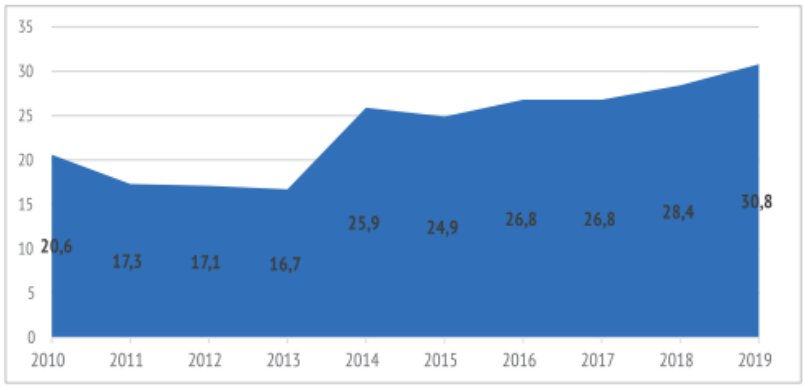
a)



b)

Figure 1. The dynamics of GDP growth in Kazakhstan in the period 2008-2019 (a) and 2008-2020 from January to June (b).

Figure 1 demonstrates to us the dynamics of GDP growth before the pandemic (a) and during the pandemic period (b). We see the significant decreases between 2008 and 2009 (global crisis), and after 2019 when the pandemic situation started.



(a)

(b)

Figure 2. Dynamics of the share of SMEs in Kazakhstan's GDP for 2008-2018 (a) and the GDP quarterly for 2019-2020 (b)

From Figure 2. (b) We can see a sharp decrease at the beginning of 2020. The above indicator in the first half of 2020 amounted to 28.4%, which is lower than the same indicator in 2019 by 0.1 percentage points (a)

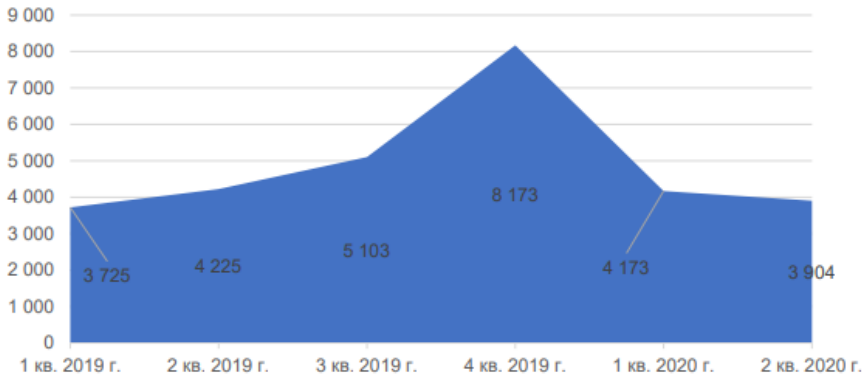


Figure 3. Dynamics of the GVA of small and medium-sized enterprises of the Republic of Kazakhstan quarterly for 2019-2020, billion tenge

Subjects of small and medium businesses in Kazakhstan produced in the 1st half of 2020 GVA in the amount of 8.1 trillion. tenge, which is 1.6% higher than in 2019 (Figure 3), however, it's significantly lower than the fourth quarter of 2019.

During or after a crisis, SMEs typically lose money, lose sales, reduce their workforce, and even shut down. During this kind of crisis, the economic performance of SMB and even large businesses get damaged from the internal and external factors.

While many SMEs approached their governments for financial support, the assistance offered differed considerably among countries and regions. Loans, subsidies, and grants have been introduced by many governments in the form of basic aid (OECD, 2020). The government of Kazakhstan has allocated about 300 billion tenge ($713 million) to support local businesses. In addition, measures to support small and medium-sized enterprises included: loan guarantees, direct cash receipts, financial support for enterprises that do not want to lay off employees, and online training. Enterprises from the construction and manufacturing sectors have felt the greatest positive impact from the pandemic, with 30% of them saying they have found new growth opportunities in 2020. Despite government support and the growth of digitalization in the whole country, Kazakhstani small and medium-sized enterprises were not ready to go online as a matter of urgency, so their economic indicators fell down.

Apart from the negative problems caused and the crisis, the Coronavirus has some

opportunities and benefits for some sectors. For example, the application of digital activities used for the first time repurposing to stimulate MSMEs in manufacturing via productioning of medical equipment and supplies made huge support during Covid-19 by many firms (Endigaw.2022).

Despite the considerable invocations businesses certainly face, there is also evidence that small and medium enterprises are ready to reopen and to regulate their business models to adapt to economic environment after the COVID-19. From the survey conducted by OECD (2020) In all of the selected countries, for instance, the most generally referred performance by business leaders of closed businesses was operating on plans for reopening. Most of them highlighted that they adjusted to the pandemic by installing either an online websites or business presence, especially in Ireland (41%) and Brazil (32%).

In the beginning of 2022, all restrictions related to the Covid-19 pandemic were lifted in Kazakhstan and in another countries. Small and medium businesses that survived from this hard time are continuing their activities.

Conclusion

Starting two years ago, the pandemic had its negative effect on the environment till these days before quarantine restrictions were totally pulled off. More and more small and medium-sized enterprises have resumed their work and continue to operate. The behavior of enterprises in this force-Majeure situation illustrates that some firms were able to adjust to the situation and increase their income meanwhile plenty of small and medium businesses were damaged, went bankrupt, and closed. The economic indicators of countries such as GDP, GNP and GVA significantly and slightly decreased as a result of strict quarantine measures. The pandemic has shown that humans cannot predict such situations or crises. Yet it remains to try to get benefit from the situation and to be flexible either negative or positive changes in an economy.

References

1. Digitally Driven, 2021, U.S. Small Businesses Find a Digital Safety Net for Adaptation, Resilience, and Innovation During COVID-19
2. Dua, A., Ellingrud, K., Mahajan, D., & Silberg, J. (2020). Which small businesses are most vulnerable to COVID-19—and when. McKinsey & Company.
3. Engidaw E.A., (2022). Small businesses and their challenges during COVID-19 pandemic in developing countries: in the case of Ethiopia.

4. Graeber, D., Kritikos, A.S., & Seebauer, J. (2021). COVID 19: a crisis of the female self-employed, Journal of Population Economics, 34(4), 1141–1187.
5. Kritikos, A.S., Beliski, M., Guenther, Ch., Thurik, R. (2021). Economic Effects of the COVID-19 Pandemic on Entrepreneurship and Small Businesses.
6. OECD (2017). Enhancing the Contributions of SMEs in a Global and Digitalised Economy. pp. 6-12. Meeting of the OECD Council at Ministerial Level, Paris. 7-8 June 2017. Available at: https://www.oecd.org/industry/C-MIN-2017-8-EN.pdf
7. OECD (2020). Statistical Insights: Small, Medium and Vulnerable Entrepreneurship and Business Statistics. Article Available at: http://www.oecd.org/sdd/business-stats/statistical-insights-small-medium-and-vulnerable.htm
8. Sandberg, Sh., Schreyer, P., Ramalho, R. (2020). Facebook/OECD/World Bank (2020), The Future of Business Survey. Global State of Small Business Report.

Proceedings of IYSC, (2022), vol. 11

Journal homepage: http://journals.sdu.edu.kz/index.php/iysw

GOALS OF CONDUCTING AND MOTIVATION FOR PARTICIPATION IN PROGRAMMING COMPETITIONS

M. Galiyev[1], G. Saimassay[2]

[1,2]*Suleyman Demirel University, Kaskelen, Kazakhstan*

Abstract

The International Collegiate Programming Contest (ICPC) in Kazakhstan has a long tradition. However, the popularity of ICPC gained significant popularity only after the beginning of the widespread use of personal computers and the rapid growth of the circle of their users. In this article, we performed a comprehensive analysis of the problems associated with the preparation and holding of such Olympiads.

Organization of the on-site ICPC olympiad could be a challenging problem to the different logical, specialized, organizational, and indeed political issues. The Kazakhstan encounter of facilitating Worldwide programming contests from the viewpoint of the specialized and logical committee. The goals of the organizers of competitions in sports programming and the motivation of their participants are analyzed. The role of moral and psychological factors in the framework of participation in such competitions is shown. Considered: a set of language tools allowed for use in solving problems; methods of preparing and holding competitions for schoolchildren and students. Information about the main sports programming competitions held in Kazakhstan is presented.

Keywords: Programming Olympiad, IOI, Contest, ICPC, Sports Programming

Introduction

The most popular and well-known programming competition among university students is the International Student Programming Olympiad (ICPC). It was first held in 1977 as part of the ACM Conference on Informatics. Since then, the Olympiad has been held annually under the auspices of the Association for Computing Machinery (ACM).

ACM ICPC could be a group understudy competition, which forces certain confinements on the composition of participants: university understudies or graduate understudies of the primary year of ponder are not more seasoned than 24 a long time ancient, each team consists of three individuals. Understudies cannot take an interest more than twice within the last organize and more than five times within the territorial determination.

The group is entrusted with the ought to fathom as numerous of the proposed tasks as conceivable in a constrained time. Some time recently the ultimate, there are a few territorial choice stages (quarter-finals and semifinals), for which the colleges of the comparing locale can designate any number of teams. However, no more than one group from one college can get into the ultimate, which is held each year in a distinctive nation.

The organizers of the ICPC are usually higher education institutions, state educational authorities and corporate structures (in the latter two cases, with the participation of higher education institutions). On a competitive basis, the ICPC is attended by: schoolchildren (mainly of the senior classes); students of universities and technical schools (mainly in specialized specialties); graduate students of the first years of study. On a non-competitive basis, ICPC can participate also postgraduate students of senior years of study, teachers, etc. The motives for the participation of schoolchildren in the ICPC are usually: confirmation of their own skills and abilities in conditions of direct competition with other participants; support the reputation of schools (colleges), receiving awards giving the right to out-of-competition to universities, etc.

Analysis of the goals of conducting and motivation for participation

A. Olympiad for Schoolchild

For schools, the goals of holding internal Olympiads and participating in ICPC are higher levels are: the organization of extracurricular activities that stimulate programming; selection of schoolchildren to prepare for competitions of higher levels; hiding the reputation of schools at district, city, regional ICPC, etc. [1]

The objectives of participation in the ICPC of school education authorities in the regions: evaluating the levels of training of schoolchildren in various educational institutions in ICPC; selection for admission to universities. [2] For universities, the costs of holding ”school” Olympiads are justified by increasing their competitiveness in the regions, career guidance and selection opportunities.

B. Olympiad for University Students

People who become champions and receive medals at the final of the competition, as a rule, begin to study at school, most of them have some success at school olympiads. Why do students need it? Even leaving aside such pleasant things as the opportunity to travel to cities and countries where tournaments are held and make new acquaintances with like-minded people, as well as an interest in programming and a passion for competition, there are several important dividends that can be drawn from such an experience.

Firstly, the Olympiad involves and motivates a person to write a lot of code, and as a result, he writes it quickly and without errors. This is very useful in future professional activities. When this person comes to get a job, where he will be interviewed, for example, for the position of a developer, he will be offered to solve the same Olympiad problems. [3] If he has the appropriate

experience, he will easily get the desired position.

Secondly, in general, achievements in these competitions are an indicator of a student's strong intellectual abilities. [4] During their participation in ACM competitions, students acquire the skills to find optimal solutions to fairly complex problems, which helps them to successfully process large amounts of data that they have to deal with when working on real projects.

Thirdly, of course, prestige. The participants of the Olympiads spend a huge amount of time and energy, but the medal of international competitions is an excellent result, which increases the attractiveness of a university graduate in the eyes of potential employers. For example, the ACM/ICPC finals are regularly sponsored by IBM, which offers cash prizes to tournament winners, as well as internships or jobs for members of the gold-winning teams.

C. Benefits for Universities

For universities, the participation of their teams (and individual participants) in the ICPC makes it possible to compare the quality of students' training in the field of programming in an explicit way, and improves the repute of universities at the regional level and in the system of higher education in Kazakhstan. There is no increase in their competitiveness in the market of postgraduate education services, potentially contributing to obtaining certain types of grants, etc. Within the framework of the ICPC, universities can carry out internal selection of students to attract them in research and contractual activities, work on grants, admission to postgraduate and master's programs, etc. to work - both during the period of study and after graduating from university.

The level of corporate interest in such contacts reflects the fact that the preparation and conduct of most of the ICPC interregional and international level is sponsored by large commercial firms working in the field of informational technologies.

To a lesser extent, ICPC is used as a platform for the selection of future employees by government bodies and research organizations. [5] From the point of view of the Ministry of Education and Science of the Kazakhstan, the implementation of the ICPC helps to improve the training of students in areas related to information technology: it allows you to compare (with a number of reservations) the quality of such training in different universities; contributes to increasing the authority of Kazakhstan universities at the international level, since, unlike a number of Olympiads in other areas, domestic ICPC are either open or continue in the form of international competitions.

Methodology for the preparation and conduct of the icpc

In Kazakhstan, ICPC mainly has two directions - for schoolchildren and students, and sometimes schoolchildren also take part in student Olympiads. Competitions can be held in person, in online (remote) and in hybrid mode. Information technologies are widely used during the ICPC - both within the local area networks (LAN) and using the Internet.

Among schoolchildren, competitions are usually held in the individual standings, and among students - mainly in the form of competitions in teams of three people. Objectively, the team form of the competition allows: to instill in participants the skills of teamwork, distribution and coordination of efforts (which is very useful in view of their future work in organizations).

New commands regarding the scope of work within the framework of the ICPC (in the simplest case: algorithmization tasks, actual programming, preparation of tests); in some cases to develop the division of tasks between team members. Usually participation in one team of persons is allowed and representing various educational institutions (i.e. national teams).

The preparatory stage of the organization of the ICPC in the general case includes:

Determining the timing of the implementation

Preparation of tasks and sets of tests for them, distribution of information about competitions (or posting this information on the site)

Preparation of registration rules for individual participants or teams

Development of competition regulations

For both face-to-face and distance competitions, registration is usually provided. Participants, which allows you to determine in advance the required number of computers in other places (according to the number of participants). For mixed form competitions, a preliminary (qualifying) round is usually held in a remote form, and it may have a duration from several hours to several weeks. The content of the tasks is usually given to participants in Kazakhstan, but English can be used for ICPC of sufficiently high levels (only English is used at international competitions). In most cases, the text of the task conditions is accompanied by 2-3 simple tests (input data + results) so that the participants can test their developments offline.

An analysis of the nature of the problems used in the framework of the ICPC shows that their successful solution requires knowledge not only in programming techniques, but also in a number of areas of applied mathematics, methods of algorithms, etc. Therefore, the composition of teams for Olympiad can be of a mixed nature, i.e. include not only programmers. The language

tools that can be used to program solutions to problems within the framework of the Olympiad are, as a rule, rather limited. By standard the rules of the World Cup in Programming (ACM-ICPC), it is allowed to use three languages(C, C++. Java). [6] However, some competitions allow the use of other languages, in particular Free Pascal, as well as Delphi. During ICPC, benefits are usually allowed for any literature and personal records, but it is forbidden to use any other electronic form, personal computers or calculators, mobile devices, links, pre-designed libraries of procedures, etc. Most face-to-face competitions are held in one round. Its standard duration is 5 astronomical hours. For entry-level competitions, it is often used to check the work performed by the jury in the "manual mode" after the end of the competition.

However, for any serious ICPC, participants are given the opportunity to check the correctness of their decisions in on-line mode - within the LAN during face-to-face competitions and via the Internet, if these competitions are remote. Such an automated check is carried out on a system of tests, and their number is greater than that given in the conditions of the problems. available to participants. The number of attempts (sending solutions to problems for verification) is usually not limited, but participants are awarded penalty points for incorrect solutions.

Solutions are considered incorrect: containing syntax errors that exceed the allowable limits on the computation time (time limit) or the amount of RAM (memory limit). The last two types of errors are used to encourage participants to use algorithms that are computationally efficient. [7] At the same time, if the solution satisfies the indicated limitations, then additional points for increased computational efficiency are not awarded. For incorrect decisions, participants are awarded penalty minutes, which in the end are taken into account only for decision tasks. There is usually no limit on the number of attempts per task.

Conclusion

During the preparation for the Olympiads for the intermediate control of the received knowledge pupils and students can participate in remote Internet programming olympiads. The experience of participating in such competitions helps to increase the level of the subject preparation of the participant, since he get acquainted with the technologies of holding Olympiads; receives sets of tasks and their criteria evaluation, the ability to solve problems in conditions close to the conditions of real Olympiads in virtual competition with other participants, as well as its self-development, self-knowledge.

It should not be forgotten that successful participation in programming tournaments gives young

programmers the opportunity to obtaining a prestigious and well-paid work in the computer industry, and for schoolchildren - the possibility of entering and further education in prestigious universities of the country. Thus, systematic work on the preparation for Olympiads in Informatics provides conditions for the effective development of giftedness of students.

References

1. Yermoshin Alexander Vladimirovich, Experience Of Organizing A Remote Programming Olympiad For Schoolchildren, 2020
2. Krassimir MANEV, Emil KELEVEDJIEV, Stoyan KAPRALOV, Programming Contests for School Students in Bulgaria, 2007 Institute of Mathematics and Informatics, Vilnius
3. Svetlana Litvinova, Organization of Independent Studying of Future Bachelors in Computer Science within Higher Education Institution, National Technacal University of Ukrain
4. Zhu Jie-ao, Sun Mian, Liu Xue, Learning Software Engineering through Experience of ACM-ICPC Training and Practicing Exercises
5. Dolinsky M.S., PROGRAMMING OLYMPIADS FOR PRIMARY SCHOOL. Informatics at school. 2016;(7):43-51.
6. Wu, W.-H., Wang, J.-D.: The Analysis of Applied Algorithm and Programming. Publishing House of Electronics Industry, Beijing (1998)
7. Sandor Kiraly, How to teach computer programming if our goal is the International Olympiad in Informatics, 09.01.2011 University of Debrecen

Proceedings of IYSC, (2022), vol. 11

Journal homepage: http://journals.sdu.edu.kz/index.php/iysw

IMPLEMENTATION OF PROJECT MANAGEMENT TECHNIQUES IN IT COMPANIES

Zh. A. Kanatuly

Kazakh-British Technical University, Almaty. Kazakhstan

Abstract

The thesis covers the topic of implementing the useful techniques used in Project Management in development of IT projects, which some of the IT companies seem to ignore using. Companies might prefer the freedom and flexibility in development by ignoring the fact that some techniques might increase the efficiency and provide the developer team and activities some firm organization.

Key words: Project management, product management, agile, flexibility

The objective. The objective of this article is to demonstrate the importance of implementing the techniques of Project Management in IT companies.

Brief methodology. For this research, the secondary source of data will be used by comparing the older and newer trends in IT companies. The sampling design will be done by applying non-probability sampling, where instead of wide and random range of resource units, the example of famous and successful companies will be chosen to demonstrate the efficiency of the Project Management techniques. The data collection is performed by studying documents and records, also the case studies will be used to make a detailed analysis of particular pattern in the IT industry.

Findings. One of the widely used techniques IT companies is the Scrum, which can significantly improve the quality of the product by a better management of the development processes depending on the time and resource limitations.

Brief interpretation. Brief interpretation of the idea is that the implementation of Project Management techniques would positively impact the usage of the company resources by approaching the scheduled tasks in a most flexible way.

Introduction. The competition in the global market requires the ability to adjust to the current pace and changes in business environment. The companies need an agility in project development to offer new products and solutions. This thesis will focus on the theory of Agile Project Management, where the New Product Development must be positively affected.

New Product Development. According to Almeida et al (2021), the development of a product is a complex procedure, requiring different set of management tools, which will result in faster deliverance of the final product with enhanced qualities. [3]

Agile Project Management. According to Stare (2014), it is implied that the project has

little information on what activities have to be done in initial processes. Therefore, it is accepted to use agile approach in creating the backlog of upcoming tasks after regular review of the smaller tasks in the initial stage of the product development. [2]

The agile approach is supposed to complement the traditional project management by enhancing the processes, which tend to stall the processes, which could be done in faster instances by bypassing the older approach. The usage of Agile Project Management supposes that the Agile approach could benefit in using self-managed team and wider vision of the processes. [2]

Backlog. According to Almeida et al (2021), the wider picture of the overall progress can be approached by using the backlog for the current product development, where the all upcoming but stalled processes are indicated in the "backlog" column of the canvas table. The "To do" activities could involve the processes, which are used to build a strong prototype and get the feedbacks from the customers. The iterative approach will bring the possibility to validate the customer demands and solve the active problems in the development of the new product. [3]

Pre-development stage. This stage must indicate all the important tasks, upcoming activities, restriction and limitations, an the critical points for the development of new product. The market research must be done in order to clarify the situation. The project mapping could be a great solution to create the clear image of current situation and identify the next steps in the overall process.

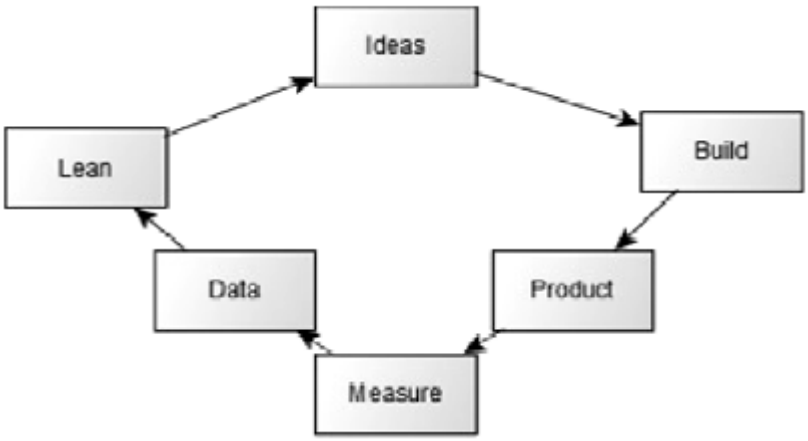
Development stage. According to Almeida et al (2021), this stage implies creating a prototype to test the product after each corrections made according to the customer feedback. The process can be iterative in order to provide a constant development and team's understanding of the situation.

There are 4 steps in this stage: (1) Design for Additive Manufacturing, (2) Construction, (3) Test, and (4) Customer, where the customer's backlog is fulfilled based on the initially set Backlogs. [3]

According to Stare (2014), the product development must be divided into smaller iterations, which are manageable in term of resources and time. Such approach could benefit in better organizations and execution of tasks. [2]

According to Nidagundi and Novickis (2016), the life cycle starts with predictions and ideas, which flow into tasks to be proven by some metric, which will result in being applied in a final product. The Figure 1 indicates the flow of the insights from "ideas" to the "measure"

milestone. [1]



Post-development stage. This stage implies the documentation and validation of the processes and succeeded milestones. The team can make a review of the results, processes to make some lessons before a closure of the project.

According to Nidagundi and Novickis (2016), the testers must be able to synchronize with the market and the developer team, in order to keep up with the current processes. [1]

Conclusion

To conclude, it can be stated that the disadvantages of the classic approach to the project management could be complemented with the agile approach discussed in this thesis.

References

1. P. Nidagundi and L. Novickis (2017). ScienceDirect. Introducing Lean Canvas Model Adaptation in the Scrum Software Testing. Retrieved // URL: https://www.sciencedirect.com/science/article/pii/S1877050917300790
2. A. Stare (2014). ScienceDirect. Agile Project Management in Product Development Projects. Retrieved // URL: https://www.sciencedirect.com/science/article/pii/S1877042814021259
3. J. Almeida et al (2021). ScienceDirect. Innovative Framework to manage New Product Development, Integrating Additive Manufacturing and Agile Management. Retrieved // URL: https://www.sciencedirect.com/science/article/pii/S2212827121008611

Proceedings of IYSC, (2022), vol. 11

Journal homepage: http://journals.sdu.edu.kz/index.php/iysw

APPLICATION OF NEW METHODS OF TEACHING BIOLOGY WITHIN THE FRAMEWORK OF STEM

V. Rastorguyeva[1], A. Shametov[2], A. Kozhamzhar[3], D. Kanatova[4]

[1,2,3,4]*Suleyman Demirel University, Kaskelen, Kazakhstan*

Abstract

This study examined the current advancement in implementing methods of teaching biology within STEM at the schools of Kazakhstan. Data were collected from 33 teachers and 218 middle-school students representing various educational institutions such as State Lyceums, General Education Schools, and NIS/BIL/RPHMS via questionnaire. Results showed that the number of teachers applying STEM techniques has significantly increased, whereas many students are still not entirely familiar with the practice. One significant issue that both teachers and students have noted is the lack of high-tech equipment available at most schools. Therefore, the second part of the research investigated the possibility of introducing STEM experiments using only readily accessible materials. Ten students from the State Lyceum observed and participated in four STEM-related biological experiments, and their feedback was further recorded. Despite the apparent enhancement of the students' engagement in the studying process and positive reviews regarding STEM experiments, a lack of specialized hardware has remained a significant drawback. Additional consequences and limitations are discussed.

Keywords: teaching biology, STEM methods, Kazakhstani schools.

"Education is the stem, which makes us strong enough to stand in any situation" (VVK).

Undoubtedly, education has always been considered one of the primary human needs that opens up numerous perspectives to individuals and can bring any country to a new level of development. Metaphorically, it is possible to compare the essence of education with the tree's stem. Without a robust foundation, a tree cannot survive harsh weather conditions. Similarly, present-day society requires each individual to be strong and competitive to resist emerging challenges and pave one's way to success. Due to the rapid development of technologies, science education plays a significant role in unleashing human potential and enhancing the living standards of a country in the long run. Because of this, many educated professionals are constantly searching for ingenious teaching methods aimed at improving the quality of education as a whole.

Despite a myriad of reforms designed for now to improve the quality of Kazakhstan's education system, the general level of education remains low, according to the Best Countries Report. Based on the study conducted across 78 countries by the U.S. News and World Report, BAV Group, and the Wharton School of the University of Pennsylvania, Kazakhstan took 71st place (U.S. News & World Report, 2021). The OECD's Programme for International Student

Assessment (PISA) is another internationally accepted program specifically designed to evaluate the quality of acquired knowledge among the 15-year-olds secondary school students. Starting from 2009, Kazakhstani students have taken the examination four times. However, in 2018 the results observed a negative trend. Considering particular indicators of Kazakhstan, the mean score in science performance is one of the lowest among PISA-participating countries and economies, making up a 397 PISA Score. Thus, out of 77 countries, Kazakhstan was ranked 68 (OECD, 2019). The outcome suggests that Kazakhstani students lack critical thinking skills and the ability to interpret problems. Although teachers provide students with decent subject knowledge, not enough attention is given to teaching them to apply these skills in real-life situations. Indeed, students often cannot comprehend why it is necessary to memorise elements from the Mendeleev table by heart in Chemistry and study the structure of the cells in Biology without being capable of discovering their significance in real life. As a result, it is hard for students to form profound integrated knowledge and develop comprehensive thinking skills essential for solving global issues. For instance, while environmental activists are looking for assistance in solving the global warming problem, the modern generation might even be unaware of the existing issue. What is more, knowledge obtained from the separate subjects does not enable students to form a bigger picture. Consequently, the conventional approaches to education are not fully practical, so one of the promising steps to improve education level is introducing innovative teaching techniques.

As one of the ways of solving these issues, STEM education was implemented as a modern teaching approach widely used in developed countries. It is based on an integrative teaching method that combines four branches, namely Science, Technology, Engineering, and Maths. It means that all subjects are taught in connection with one another. The core principle states that it is much easier for students to perceive information empirically (that is, through observation, which is carried out by sensory organs). Alternatively, the simple study of the "dry" theory appears ineffective. Thus, STEM education involves mixing theoretical lectures with practical works that allow students to achieve the most promising results while learning.

STEM covers many scientific branches which have a close relationship with human life. This fact repeatedly underlines the importance and necessity of introducing STEM methods into education. STEM education also develops students' critical thinking skills and the ability to analyse information and find solutions to problems independently. Furthermore, STEM education has become widespread due to the rapid development of technology globally, preparing the young

generation for the rapidly developing technological progress. In addition, based on previous studies, it has been established that with the development of STEM education, economic growth is observed, which, in turn, benefits the country (Mallory Croak, 2018; Sullivan and Bers, 2018). STEM education popularises jobs related to science and technology among young people, including jobs related to I.T., engineering, manufacturing, etc. Kazakhstan also tries to keep up with other nations, providing local school students with new learning possibilities. Overall, access to STEM education at schools will allow Kazakhstan to be competitive in the global market in the long run.

Considering the statistics mentioned above, STEM education has not yet been successfully implemented in the schools of Kazakhstan. Thus, it is evident that teachers are struggling while selecting effective methods of teaching STEM in the classroom. For now, it is crucial to understand whether biology teachers have already encountered STEM in their practice and how their attempts have influenced students' understanding of STEM. Additionally, since one of the striking obstacles remains the availability of scientific equipment, finding alternative ways of introducing STEM methods to the classroom will make a breakthrough in science education in Kazakhstan. Addressing this issue will show the practical benefits of STEM methods application in teaching biology and will contribute to enriching students' learning possibilities. Ultimately, our findings can positively affect Kazakhstani students' performance in international assessment measures.

The work focuses on discovering answers to two main research questions. Are schoolteachers and students generally aware of STEM education and methods? To what extent is it possible and effective to teach biology within STEM without high-tech equipment? It is possible to determine two main objectives of our research work arising from the stated research questions. The first part of the research is aimed to discover through the questionnaire whether teachers in Kazakhstan are already aware of STEM and what methods of teaching it they have found to be valid. Additionally, it is essential to evaluate students' current experience in STEM-related projects and their general awareness and attitude to the matter.

Secondly, four STEM-related biological experiments will be tested throughout the work in the setting of the State Lyceum. Therefore, conclusions regarding the affordability and effectiveness of these methods will be recorded and presented. It is compulsory to understand whether schools in Kazakhstan are ready to deal with STEM in 2022 and if the number of those aware of STEM has risen after the implemented reforms.

Finally, suppose the experiments manage to prove the fact that implementing STEM is not always complicated and costly. In that case, we will be able to provide teachers with suggestions on how to introduce STEM to students in the classroom.

Methodology

Sample

The two questionnaires were constructed with the help of the Google Forms tool for teachers and students independently, with Russian and Kazakh languages of instruction to overcome potential language barriers. One of the most accessible and readily available tools to gather data for research in social science is a questionnaire. Before developing items for the questionnaire, it was necessary to consider the potential benefits and drawbacks of the research method itself. The pros and cons listed in "Developing a questionnaire" (Gillham B., 2007) were examined and adjusted to the research. Additionally, it was crucial to consider the language of instruction to increase the sample size and determine if any potential difference could occur between Kazakh and Russian classes. The variance was expected to arise due to the lack of online learning resources available in the Kazakh language. While developing questions, the primary consideration was to capture disputable issues regarding STEM and assess both teachers' and students' readiness to reinforce unconventional methods. Meanwhile, the questions presented could be easily comprehended by respondents without imposing any confusion or difficulties on them, taking only 5-10 minutes of their time. Most questions were with multiple-choice answers to achieve simplicity, including several five-level Likert items (Likert R., 1932). Overall, the questioned audience reached 33 teachers and 218 students from Almaty.

Items development

The first questionnaire was designed specifically for school science teachers (i.e., Biology, Chemistry, and Physics). Each respondent completed 13 questions. The survey inquired about the following issues: type of educational institution, working experience, familiarity with the term STEM, implementation of STEM at school, the necessity of introducing STEM methods into schools, specific conditions allowing for application of STEM methods, readiness, and required professional skills to teach STEM, and potential difficulties. Furthermore, some questions were aimed to compare the teachers' perception of the effectiveness of modern teaching techniques with the conventional approaches. The final questions focused on conditions for successful implementation of STEM education and currently available school resources. Specifically, the

items evaluated teachers' knowledge of the subject area, essential technical and laboratory equipment, support from the school administration, advanced training courses in the STEM field, the collaboration of teachers of various disciplines, course materials, motivation of students, the parents' support, and the number of teaching hours available.

The second questionnaire was distributed among school students of Nazarbayev Intellectual Schools (NIS)/Bilim-Innovation Lyceums(BIL)/Republican Physics and Mathematics School(RPhMS), state lyceums, and general education schools. The questions tested the students' general awareness regarding STEM practices, their perception of STEM, and the possibility of benefiting from STEM through a future career. Additionally, learners evaluated the school readiness to use STEM methods and the level of importance of STEM adoption in schools in Kazakhstan. Finally, students shared their previous experiences of participation in STEM-related projects and responded if such techniques have previously been implemented at their schools.

Experiment

The second part of the study was undertaken by testing the effectiveness of implementing easily accessible methods of teaching biology within the STEM framework. The main target was to deepen students' comprehension of the Biology subject by conducting simple demonstrations that are not costly and require only basic equipment available at each school.

Firstly, four biological experiments were selected with the help of the website https://www.sciencebuddies.org/. The experiments were chosen by taking into consideration such criteria as affordable equipment and materials, correspondence to the school biology curriculum, and duration of the experiments.

The experiments were the following:

1. Do-It-Yourself DNA
2. How Water Moves Through Plants
3. How Do Viruses React To Soap?
4. Exploring Enzymes

Over four weeks, the focus group of 10th-grade students of the State Lyceum observed the demonstrations and gained hands-on experience by direct participation in conducting experiments. Due to the fact that the chosen class studies Biology and Chemistry as primary subjects, one extra hour a week is administered to state exam preparation and revision of the material. The main teacher has kindly agreed to collaborate with the researchers and allocated one hour a week for

conducting teaching sessions. Another important criterion when selecting experiments was their real-life application.

The usefulness of the methods was further registered and evaluated via written feedback from students—ten students filled in a form through the online service SurveyMonkey (https://www.surveymonkey.com). Designed questions inquired about students' attitudes towards performed experiments and learning outcomes they have possibly brought. Additionally, the respondents left their comments regarding the possible future changes in using STEM methods, including frequency of application, the need for a high-tech laboratory and specific preferences during Biology lessons.

Interview with the STEM biology teacher

One of the teachers who participated in the questionnaire agreed to collaborate and talk about using STEM methods in the classroom. The interviewee is currently employed at the General Education School in Almaty as a headteacher responsible for introducing innovations. Thus, the interviewee started to learn about STEM and how to implement it, which led to organizing the Young Teachers Club. This club aimed to educate over 25 young specialists in STEM methods and innovative technologies. For instance, club members have learned to use different methods in the classroom, such as PBL, IBL, and laboratory work. The school also aims to open a garden with different types of plants where students can learn what kind of plants can be planted at school and how to take care of them. According to the interviewee, the club positively impacts the learning process. For example, it reveals the desire to learn! Children start to participate fully in the learning process, offer new ideas, work in a group, and help each other.

However, the interviewee noted several drawbacks that might negatively affect enhancing STEM education in Kazakhstan: teachers' motivation to develop their skills, overcrowded classrooms, and the lack of methodological materials in the Kazakh language. The interviewee believed that advanced laboratory equipment is necessary, but a lack of it should not be the reason not to implement STEM. Educators should be creative in utilizing any available materials to provide STEM education to their learners. Overall, the interviewee emphasized the importance of creating learning environments for teachers.

Discussion and Conclusion

Teachers' perception of STEM methods application

The data collected in this research indicate that general awareness regarding the STEM

methods application among school teachers has significantly increased. Previous research had shown that two-thirds of the surveyed teachers did not know how STEM education was implemented in their schools. Additionally, 70.7% of teachers had never participated in STEM education events. Most teachers had either rarely (57%) or never (22%) encountered the term STEM. On top of that, 62.8% of teachers were unaware of the STEM abbreviation (Caravan of Knowledge, 2020). However, contrary to the hypothesised association, our findings have shown that 80% of teachers, mainly young specialists with about one year of working experience employed at General Education Schools, are actively and nearly effortlessly introducing STEM techniques into the Biology classroom (fig. 1).

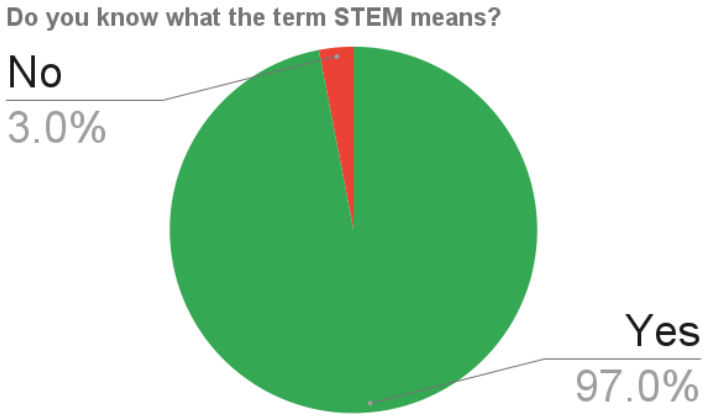


Fig. 1 Interviewed teachers' awareness of STEM

At the initial stage of the study, the percentage of teachers using STEM at low-funded schools was significantly lower than in highly-funded education institutions. However, the results showed a different trend once the questionnaire was distributed among teachers of one General Education School (fig. 2). Most young teachers with less than one year of work experience actively engaged in STEM practices are employed at that institution. These findings are verified by the interview of the headteacher who teaches Biology at that school. Apparently, these teachers are members of the "Young Teachers Club" mentioned before.

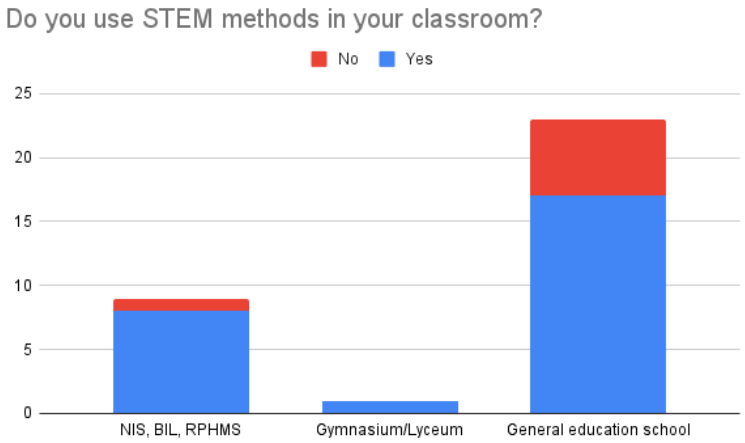


Fig. 2 Interviewed teachers' usage of STEM methods in the classroom

As was previously mentioned by our interviewee, the example of the school is unique. Usually, low-funded General Education Schools are not involved in STEM (Caravan of Knowledge, 2020) because they believe STEM is purely dependent on high-tech equipment. Our questionnaire results have also shown that almost 50% of the interviewed teachers believe that STEM education is dependent on special equipment and only 30% of the respondents acknowledge the possibility of teaching STEM with available tools (fig. 3).

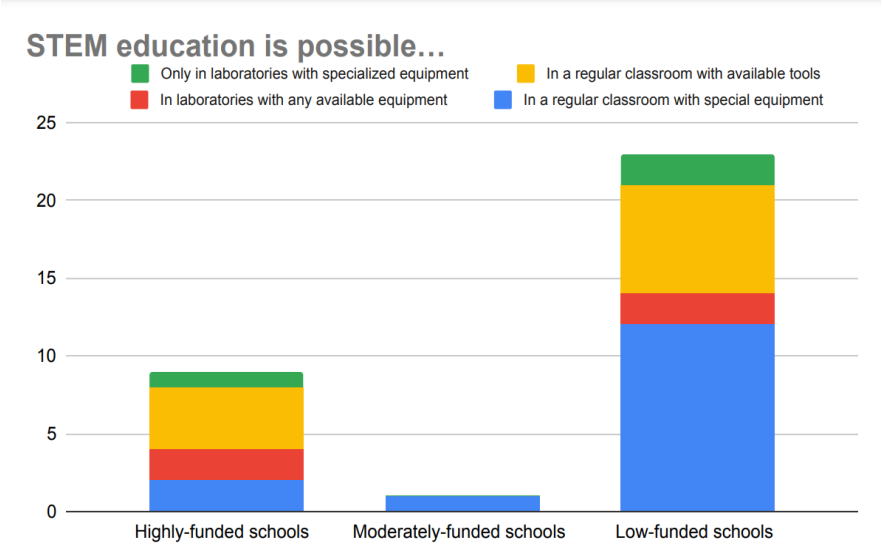


Fig. 3 Necessary conditions for implementing STEM

However, as Wiswall, Stiefel, Schwartz, & Boccardo (2014) have written, STEM can be taught by using various methods. Our interviewee has also noted a wide choice of methods (PBL, IBL, simple laboratory works and experiments with readily accessible equipment). For instance,

demonstrations conducted as a part of the research did not require expensive equipment. Despite this, materials essential for these demonstrations are not usually purchased by schools. Consequently, it is challenging, and teachers cannot cover these expenses with their budget. Thus, low-funded schools should purchase at least essential tools as an alternative to high-tech equipment. Without the support from the school, STEM introduction will be exceedingly difficult. Surprisingly, according to the questionnaire, 80% of teachers are confident in their STEM teaching qualifications (fig. 4). However, the previous studies have shown the opposite statistics. According to the study conducted by the Caravan of Knowledge (2020), a vast majority of teachers noted that they need more courses and seminars to learn about STEM education (78.9%). We can assume that our statistics were influenced by the fact that many interviewed teachers participate in the "Young Teachers Club" described by the previously interviewed headteacher. Because of that, we can say that the practice of organising teacher training clubs with a peer-to-peer learning approach is an efficient strategy, and the rest of the schools should note it.

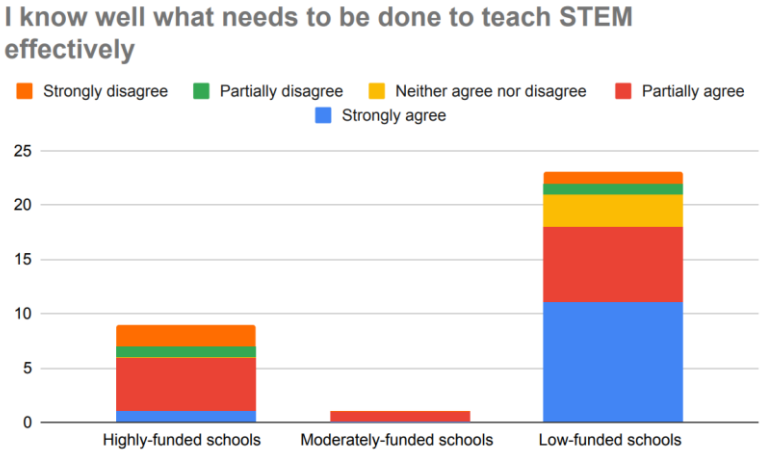


Fig. 4 Teachers' self-assessment of professional training

Considering the benefits of STEM and its importance, teachers' responses focused purely on the advantages of STEM for students' development. As mentioned before, teachers most often say that STEM helps students develop practical skills and apply them in life. Generally, their views are similar to those mentioned by Wiswall, Stiefel, Schwartz, & Boccardo (2014), as they have noted how STEM education contributes to promoting a competent workforce. Meanwhile, teachers are either unaware or underestimate the benefits that STEM methods can bring to them. According to Ismail Z. (2018), one of the striking benefits of STEM lies in improving teachers' professional development. Our interviewee also mentioned the enhancement of students' performance as a

benefit for teachers. There is an interconnection between the students' attitude to lessons and teachers' motivation to work. Surely, STEM methods can spark students' interest, which, in turn, leads to increased job satisfaction among teachers. Despite this, we believe that teachers must fully recognise that applying STEM methods is also a significant step in teachers' career and professional development. If they do so, it will help teachers to preserve motivation for a long time and achieve even more effective results. Thus, the school administration must also provide each teacher with sufficient support. On top of that, we have observed both from the questionnaire and the interview that teachers understand the importance of modern teaching approaches and are ready to implement them.

Students' perception of STEM methods application

The data obtained in this research from the questionnaire among students suggests that the students' awareness regarding STEM varies drastically depending on the funding of the school they attend (fig. 5). Previous research conducted by Caravan of Knowledge (2020) implies that 63.5% of Kazakhstani schoolchildren have not yet familiarised themselves with STEM education. However, according to data obtained in this study, awareness of STEM in both State Lyceums and General Education Schools is extremely low, with only 46% and 26% of students knowing about STEM, respectively. In comparison, only those studying at highly-funded schools are more familiar with the STEM practice (60%) (fig. 5).

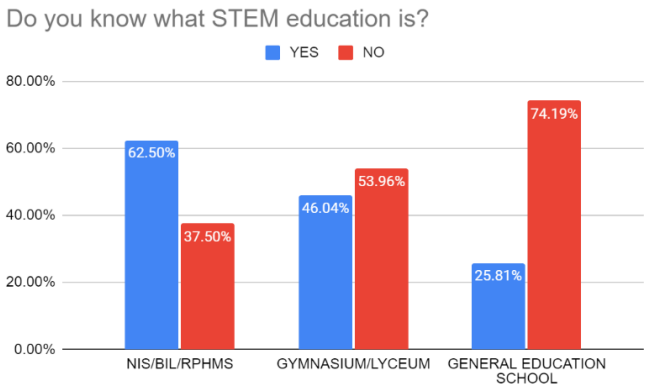


Fig. 5 Interviewed students' awareness of STEM

Additionally, the analysis of students' replies regarding STEM being used at their schools has shown a drastic difference between highly-funded and low-funded schools. Only 6% of students from General Education Schools participated in STEM methods at schools, whereas the figure for highly-funded institutions is 13 times higher (fig. 6).

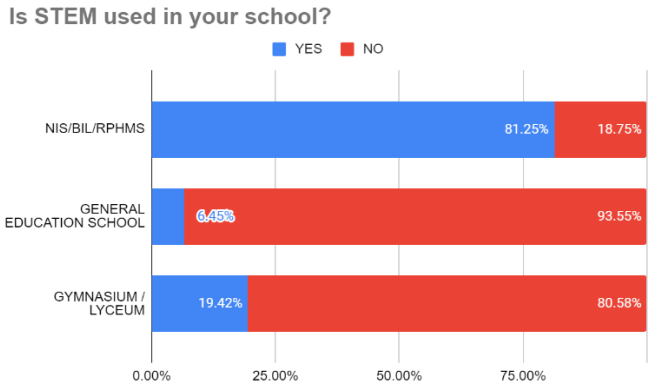


Fig. 6 Interviewed students' replies about the usage of STEM at schools

Moving on to the next essential aspect, the study evaluated students' motivation to participate in STEM-related projects. According to the questionnaire results, students' choice varies depending on the funding of their schools as well. Currently, students from State Lyceums have the lowest motivation, with almost 30% willing to participate in STEM projects in the future (Fig. 7). The results support the claims of Wiswall, Stiefel, Schwartz, & Boccardo (2014) that many students are used to memorising theory by heart instead of being engaged in practice. However, the feedback recorded from State Lyceum students after conducting STEM experiments has revealed that students unanimously agreed that the classes raised their interest in studying biology. Furthermore, 90% of the students approved that they would enjoy participating in similar activities more often. Thus, it is possible to finalise that students simply lacked previous experience in STEM and could not visualise it in the classroom. The data contribute to a clearer understanding of why the motivation level in these education institutions is lower.

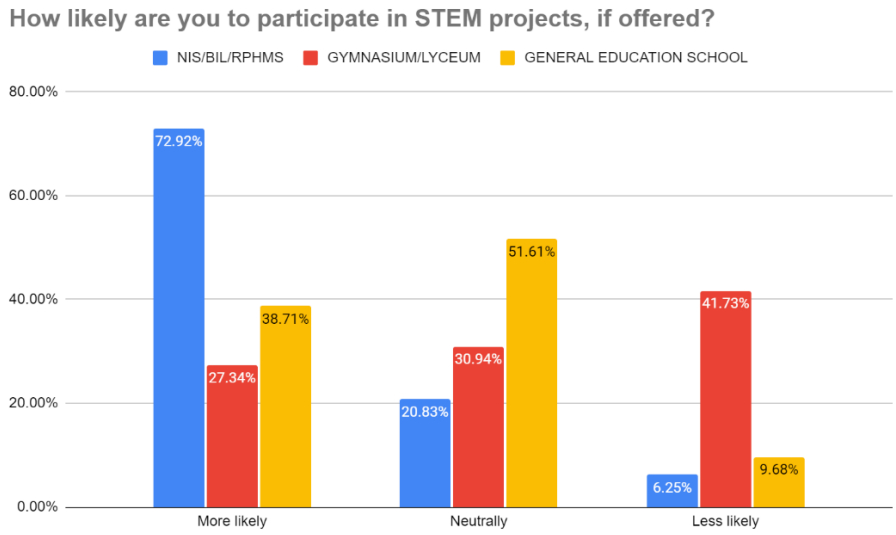


fig. 7 Students' participation in STEM projects

The interview with the STEM biology teacher revealed that it is difficult for students to participate in group work, due to their unwillingness to collaborate with peers. However, according to Net Mod View, Nazir Amir, and Chin Lu Chang, (2015), the introduction of STEM-PjBL methods increases not only analytical and critical skills but also communicative skills that improve the quality of work in a group. This data highlights the necessity to implement various STEM methods across schools in Kazakhstan.

The survey's results also showed that over 60% of students from every type of school believe that the introduction of the STEM methods into the learning process can be advantageous in their future careers (fig. 8). If a large proportion of students support this claim, it can further have a positive impact on the future development of Kazakhstan. It goes in line with the previous studies that show that many developing countries worldwide are trying to attract young people to the scientific field. For example, based on a study by J.Williams (2011), the main reasons for the popularisation of STEM among young people are the future economic growth of the country and the development of competitiveness.

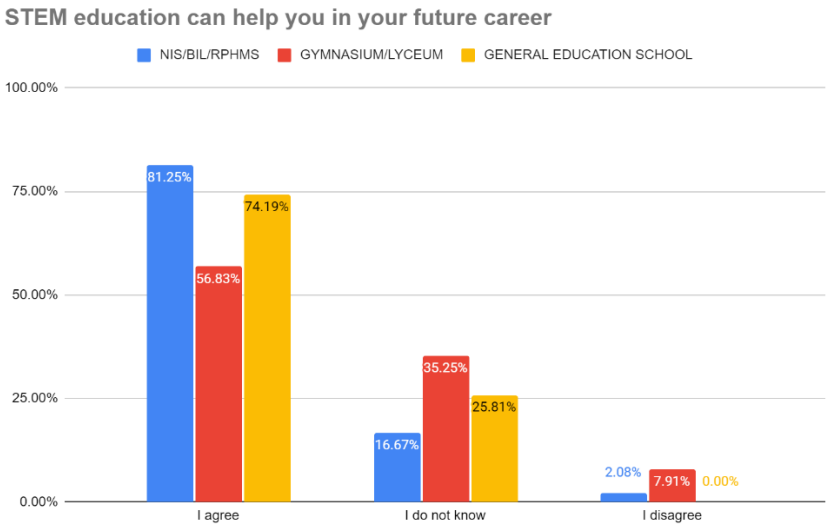


Fig. 8 Role of STEM in the future career

Finally, the initial objective of the study was to determine the possibility of using STEM without high-tech equipment. Over four weeks, we conducted four biological experiments which did not require any expensive hardware. For instance, one of the experiments was DIY DNA extraction which was noted by the majority of students as the most engaging activity. These results build on existing evidence from Ragnhild Gya and Anne Elizabeth Bjune (2021), who researched DIY experiments as an excellent possibility for students to receive real-life scientific experience.

Despite this, all the interviewed students unanimously believe that the presence of a laboratory with high-tech equipment in schools is essential for the successful implementation of STEM. However, as was mentioned earlier by Johnson (1989) and throughout this research, there is a vast range of other methods of introducing STEM into the classroom.

There are particular shortcomings to the study that can be specified. The generalizability of the results is limited by school types sampling. The interview with the headteacher from General Education School has proven that the STEM teaching program at that institution is unique. As a result, the findings cannot confirm that most General Education Schools follow the same course and are actively engaged in STEM practices. There was also a prevalence in the student sample size across moderately-funded schools compared to low and highly-funded institutions. Research methods of teaching Biology within STEM appears to be a challenge since the primary idea of STEM lies in the concept of integration. Therefore, it is impossible to evaluate the efficiency of STEM teaching methods from a single subject perspective properly. The absence of "Science" as

a separate subject and adequately qualified teaching staff hinders fully successful STEM implementation.

Another significant limitation is the unavailability of essential hardware at schools, especially at a Lyceum where the experiments were tested. It is an obstacle both for teachers and students. Buying necessary materials and reagents for demonstrations is an additional financial burden for teachers, and student's safety is compromised by the non-availability of a fume cupboard.

Conclusion

As Kazakhstani schools aim to provide their students with high education standards, the introduction of STEM methods has become one of the essential courses of development. This study's questionnaire revealed that many teachers slowly initiate STEM implementation in the classroom and even form special clubs to educate themselves through peer-to-peer learning. However, a large proportion of students are unaccustomed to STEM and claim that this technique has not been implemented at their schools, which is specifically true of moderately and low-funded schools. The research also focused on discovering the possibility of overcoming financial obstacles and introducing biological STEM experiments into the State Lyceum without high-tech hardware. Based on students' feedback, even such practices can increase students' engagement in the learning process and facilitate learning. Thus, it is possible to conclude that introducing STEM methods can be affordable; though, the availability of a laboratory at each school still remains a requirement, at least for students' safety. Additionally, a wide range of alternative methods can be used to incorporate STEM.

A complete transition to STEM-integrated teaching will transform the students of Kazakhstan into more scientifically-educated individuals with highly-developed analytical skills. Teachers should be willing to investigate unconventional teaching methods and encourage their students to study to accomplish this goal. At the same time, governments and policymakers must ensure sufficient support by providing essential facilities for all educational institutions equally.

References

1. Caravan of Knowledge (2020). STEM образование в Казахстане: текущее состояние и перспективы развития. // URL: https://courses.caravanofknowledge.com/mod/resource/view.php?id=923

2. Croak, Mallory (2018), The Effects of STEM Education on Economic Growth. Honors Theses. 1705. 26-53. // URL: https://digitalworks.union.edu/theses/1705
3. Gillham, B. (2007). Developing a questionnaire 2nd Edition. Continuum: London.
4. Gya, R., & Bjune, A. E. (2021). Taking practical learning in STEM education home: Examples from do-it-yourself experiments in plant biology. Ecology and evolution, 11(8), 3481-3487.
5. Ismail, Z. (2018). Benefits of STEM Education. K4D Helpdesk Report. Birmingham, UK: International Development Department.
6. Johnson, J. R. (1989). Technology: Report of the Project 2061 Phase I Technology Panel. AAAS Books, Dept. 2061, PO Box 753, Waldorf, MD 20604 (for price, contact AAAS offices; quantity prices available).
7. Likert, R. (1932). A technique for the measurement of attitudes. Archives of Psychology, 22 140, 55.
8. OECD (2019), PISA 2018 Results (Volume I): What Students Know and Can Do, PISA, OECD Publishing, Paris. // URL: https://doi.org/10.1787/5f07c754-en
9. Sharma, J., & Yarlagadda, P. K. (2018). Perspectives of 'STEM education and policies' for the development of a skilled workforce in Australia and India. International Journal of Science Education, 40(16), 1999-2022.
10. Siew, N. M., Amir, N., & Chong, C. L. (2015). The perceptions of pre-service and in-service teachers regarding a project-based STEM approach to teaching science. SpringerPlus, 4(1), 1-20.
11. Sullivan, A., & Bers, M. U. (2018). Dancing robots: integrating art, music, and robotics in Singapore's early childhood centers. International Journal of Technology and Design Education, 28(2), 325-346.
12. U.S. News & World Report (2021), Best Countries for Education. https://www.usnews.com/news/best-countries/best-countries-for-education
13. Williams, J. (2011). STEM Education: Proceed with caution. Design and Technology Education: An International Journal, 16(1).
14. Wiswall, M., Stiefel, L., Schwartz, A. E., & Boccardo, J. (2014). Does attending a STEM high school improve student performance? Evidence from New York City. Economics of Education Review, 40, 93-105.

Proceedings of IYSC, (2022), vol. 11

Journal homepage: http://journals.sdu.edu.kz/index.php/iysw

УЧЕТ РЕЗЕРВОВ ДЛЯ ОБЕСПЕЧЕНИЯ УСТОЙЧИВОГО РАЗВИТИЯ ПРЕДПРИЯТИЯ

А.М. Жангалиева[1], А.М. Олейник[2], Д.А. Ситенко[3]

[1,2,3]*Карагандинский университет им.академика Е.А.Букетова*

Аннотация

Статья посвящена теоретическим и методологическим вопросам признания резервов в бухгалтерском учете, видам резервов, методам их отражения в соответствии с международными стандартами финансовой отчетности. Авторы изучили методологию создания резервов, связанных с амортизацией основных средств и нематериальных активов, амортизацией резервов, резервов, отражаемых через капитал, то есть связанных с переоценкой основных средств. Методология учета резервов по оценочным обязательствам, критерии их признания. Результаты исследования могут быть использованы на практике руководителями предприятий и организаций, бухгалтерами и аналитиками. В статье приводятся различные примеры и ситуации избыточности. Продемонстрированы способы отражения в бухгалтерском учете каждой описанной ситуации и показано их влияние на показатели финансовой отчетности. Практические вопросы учета резервов рассматриваются в соответствии с соответствующими международными стандартами финансовой отчетности. Проанализированы методы отражения резервов в международном бухгалтерском учете.

Ключевые слова: резервы, предполагаемые обязательства, условные обязательства, резервы под обесценение активов, резервы для судебных исков, резервы для вывода из эксплуатации основных средств, риски.

Введение

Применение и понимание международных стандартов финансовой отчетности являются важнейшими требованиями для подготовки и представления финансовой отчетности хозяйствующих субъектов. Внедрение МСФО в систему финансовой отчетности, как в международной практике бухгалтерского учета, так и в казахстанской практике, заключалось в необходимости приведения бухгалтерского учета к единому международному стандарту.

При составлении отчетности об активах, капитале и обязательствах вопрос о резервах является важным аспектом. В отсутствие требуемой информации о резервах отчетность будет неполной и ненадежной. В результате «упущение существенной информации» может повлиять на решения пользователей[1]. В связи с этим актуальность изучения вопроса учета запасов в современных условиях не вызывает сомнений.

Одной из проблем представления качественной и достоверной финансовой отчетности со всеми необходимыми раскрытиями в соответствии с МСФО является неправильное толкование положений стандартов. Это основная причина для изучения вопросов бухгалтерского учета и представления информации о резервах активов, капитала и обязательств.

Обзор работ ученых в этой области, а также изучение практических ситуаций позволяет сделать вывод о том, что учет резервов по активам, капиталу и обязательствам в деятельности хозяйствующих субъектов имеет большое значение для разработки и предоставления истинных финансовых отчетность по показателям для пользователей.

Согласно результатам наблюдений, очевидно, что методология учета резервов вызывает много вопросов на практике, поскольку существует необходимость в понимании и профессиональном суждении, основанном на знаниях и опыте, о необходимости накопления резервов[2]. Поэтому большое внимание следует уделять учету резервов, связанных с переоценкой или амортизацией активов, и резервов по обязательствам предприятий.

Целью работы является теоретическое и методологическое обоснование вопросов учета резервов в учете активов, капитала и обязательств, а также требуемого раскрытия информации о резервах для финансовой отчетности в соответствии с МСФО.

В статье описана методология создания резервов, связанных с амортизацией долгосрочных активов, амортизацией резервов, резервов, отражаемых через капитал, то есть связанных с переоценкой основных средств, резервов по обязательствам. Результаты исследования могут быть применены на практике менеджерами, бухгалтерами и аналитиками.

Методология исследования. Основным источником для изучения вопроса резервирования в бухгалтерском учете являются МСФО, поскольку они содержат соответствующие методы и требования для признания определенных резервов.

В настоящее время в Республике Казахстан практика признания и отражения резервов в бухгалтерском учете затронула как государственные компании, так и предприятия малого и среднего бизнеса.

В связи с этим в Казахстане принято Постановление Правления Национального банка Республики Казахстан «Об утверждении Правил формирования резервов (резервов)

в соответствии с МСФО и требованиями законодательства Республики Казахстан в области бухгалтерского учета и финансовой отчетности»[3]. Ученые и практики активно обсуждают изучение учета резервов в Республике Казахстан в области бухгалтерского учета и аудита. Методологической основой исследования послужили такие общенаучные методы познания, как обобщение, сравнение, классификация, наблюдение, описание и детализация, а также методы статистического и эконометрического анализа. Использование этих методов позволило нам сделать теоретические обобщения и сформулировать конкретные рекомендации по учету запасов.

Результаты и обсуждения. В казахстанском законодательстве признание резервов раскрыто недостаточно. Не существует четких и точных методов определения зарезервированных сумм, что также определяет актуальность оценки резервов в финансовой отчетности.

Особенности налогового учета усложняют учет резервов. Проблема заключается в том, что законодательство в области налогов не предусматривает учета расходов и доходов в качестве резервов, возникающих при ведении бухгалтерского учета в соответствии с МСФО.

В налоговом учете с 10 января 2020 года расходы на начисление резервов не вычитается в соответствии с пунктом 5 статьи 242 Налогового кодекса Республики Казахстан.

Следовательно, «расходами для целей налогообложения не являются расходы, возникающие в бухгалтерском учете в связи с изменением стоимости активов и (или) обязательств при применении МСФО и законодательства Республики Казахстан о бухгалтерском учете и финансовой отчетности, кроме подлежащих уплате (уплаченных)». Более того, доход от восстановления резервов не признается доходом в составе общего годового дохода на основании подпункта 9 пункта 2 статьи 225 Налогового кодекса Республики Казахстан.

Поскольку существует разница в положениях Налогового кодекса Республики Казахстан и МСФО в части признания резервов, возникают временные разницы в соответствии с МСФО (IAS) 12 «Налоги на прибыль»; отложенные налоги признаются как в бухгалтерском учете, так и в финансовой отчетности[4].

При подготовке финансовой отчетности предприятие должно рассчитать стоимость

запасов на конец периода. Используя полученные данные, мы можем проанализировать ситуацию, когда организация, занимающаяся розничной торговлей совершила несколько покупок и получила выручку за определенный ассортимент товаров.

Другим важным вопросом является признание резервов в капитале. Это включает переоценку основных средств, нематериальных активов и финансовых активов, которые учитываются по справедливой стоимости, при этом переоценка признается в составе прочего совокупного дохода.

При наличии ранее признанного резерва для переоценки основных средств любое последующее изменение стоимости отражается путем корректировки резерва переоценки в капитале. Когда значение уменьшается, сумма резерва также уменьшается[5]. Если резерв недостаточен, то в отчете о прибылях и убытках возникают дополнительные расходы. При последующем увеличении стоимости ранее признанный убыток восстанавливается, а оставшаяся сумма, по возможности, отражается в капитале как прочий доход/резерв.

В бухгалтерском учете наиболее распространенным примером является признание резерва по судебным искам. Так, например, в связи с обнаружением бракованного товара в партии полученных запасов и в результате понесенных убытков компания 1 подала жалобу в компанию 2 с целью привлечения их к ответственности. Проконсультировавшись с юристами, руководство компании 2 предположило, что исход судебного решения не будет благоприятным для их компании, в то время как процент вероятности оттока экономических выгод по решению суда составлял более 50%, необходимая сумма возмещения убытков составила бы 50 тыс. тенге. В этой ситуации критерии признания оценочных обязательств соблюдены.

Следовательно, 2 должен признать резерв по судебным искам в отчете о финансовом положении и расходы на урегулирование претензии о прибылях и убытках на сумму 50 тыс. тенге.

Основываясь на обзоре и анализе учета резервов и их отражения в финансовой отчетности, можно сказать, что понятие «резерв» раскрывает отношения по снижению рисковых ситуаций. То есть резерв выступает в качестве инструмента страхования рисков, возникающих в финансово-хозяйственной деятельности предприятий и результаты которых отражаются в бухгалтерском учете.

Резервы, признанные в бухгалтерском учете, не представляют собой материальной

основы; мы не можем рассматривать их как резервы каких-либо денежных или неденежных активов, поскольку они имеют только экономическое значение. Таким образом, суть резервирования заключается в корректировке финансового результата с учетом возможных рисков, возникновение которых весьма вероятно. Например, резервы на переоценку основных средств (доход) или амортизацию запасов (расход) позволяют нам давать наиболее надежные бухгалтерские оценки этих активов в зависимости от рыночных факторов.

Таким образом, бухгалтерские резервы создаются для активов, капитала и обязательств, Путем признания резервов для активов в текущем периоде в бухгалтерском учете учитываются расходы, которые могут быть понесены в будущих периодах, что позволяет нам уточнить бухгалтерскую оценку актива и скорректировать финансовый результат в отчетном периоде.

Заключение

В заключение следует отметить, что, согласно МСФО, резервы, являясь важнейшим инструментом регулирования финансовых результатов в финансовой отчетности, занимают особое место.

Следует помнить, что финансовая отчетность изучается пользователями, которые, анализируя данные, принимают определенные управленческие решения. Поэтому информация в заявлениях должна быть соответствующей и качественной. Признание и раскрытие резервов облегчают такое представление отчетных показателей.

Для каждого предприятия, применяющего МСФО, важно продемонстрировать в своей учетной политике профессиональный подход к отражению резервов в бухгалтерском учете и представлению их в финансовой отчетности, помня, что резервирование в бухгалтерском учете является важным элементом учетной политики.

Подводя итоги, можно сказать, что оценка резервов в бухгалтерском учете предприятий является важной учетной процедурой, способствующей представлению объективных показателей финансовой отчетности и соблюдению принципа непрерывности бизнеса. Применение результатов исследования может служить практическими рекомендациями по достижению высоких финансовых результатов компаний, а также их устойчивому развитию. В ходе исследования авторы использовали данные первичного, аналитического учета.

Список использованной литературы

1. Закон Республики Казахстан «О бухгалтерском учете и финансовой отчетности». Закон Республики Казахстан от 28 февраля 2007 г., №234-III(с изменениями и дополнениями).
2. Закон Республики Казахстан «Об аудиторской деятельности». Закон Республики Казахстан от 20 ноября 1998 года N304-1 (с изменениями и дополнениями).
3. Об утверждении Правил формирования резервов (резервов) в соответствии с МСФО и требованиями законодательства Республики Казахстан в области бухгалтерского учета и финансовой отчетности [Электронный ресурс] - https://adilet.zan.kz/rus/docs/V1700016502
4. Резервы в бухгалтерском и налоговом учете [Электронный ресурс] - https://cdb.kz/sistema/biblioteka-bukhgaltera/articles/rezervy-v-bukhgalterskom-i-nalogovom-uchete/
5. Как учитывать резервы? [Электронный ресурс] - https://online.zakon.kz/m/amp/document/31476248

Proceedings of IYSC, (2022), vol. 11

Journal homepage: http://journals.sdu.edu.kz/index.php/iysw

ВЛИЯНИЕ БРЕКСИТА НА ВОПРОС НЕЗАВИСИМОСТИ ШОТЛАНДИИ: АНАЛИЗ И ПРОГНОЗ

Г.Н. Ережепова

Казахский Национальный Университет имени аль-Фараби, Казахстан, Алматы

Аннотация

Статья посвящена выявлению роли и влияния феномена «брексит» на вопрос независимости Шотландии. 31 января 2020 года – знаменательная дата в истории Европейского Союза, именно в этот день Британия официально вышла из состава ЕС. Это был уникальный случай за все время существования европейской интеграции, когда одна из стран-участниц приняла решение выйти из ее состава. Финал брексита шокировал не только мировую общественность, но и самих жителей Британии. Победа сторонников евроскептицизма стала неожиданностью и для них самих.

Однако не все члены Соединенного Королевства согласны с подобным исходом. В первую очередь речь идет о Шотландии. Еще в процессе брексита шотландский премьер Никола Стёрджен отмечала, что Шотландия не может быть «пленницей» Соединённого Королевства, и должна самостоятельно решать свою дальнейшую судьбу. Брексит кардинально поменял ситуацию в вопросе определения независимости Шотландии. Опросы свидетельствуют об увеличении числа сторонников выхода Эдинбурга из состава Британии. Сами шотландцы встречают брексит как глубоко печальное событие.

Ключевые слова: «брексит», Великобритания, Шотландия, независимость, референдум.

Брексит стал одним из важнейших событий, касаемых дезинтеграции на территории Европы. Это первый случай в истории Европейского союза, когда из ее состава вышла страна-участница. Британия давно обдумывала идею выхода из союза, тому поспособствовали ряд причин:

- Миграционная политика. Британия стала одной из пострадавших стран инициативы ЕС открытых границ, ведь именно туда стремятся все трудовые мигранты и беженцы, не только из других частей земли, но и из стран Восточной Европы, присоединившихся к ЕС в 2004 и 2007 годах.

- Евробюрократия. Законы и правила, коих множество в Европейском союзе, стали ограничением для развития инфраструктуры и бизнеса Туманного Альбиона. В случаях же принятие наиболее важных решений в рамках ЕС требует долгих согласований со всеми членами.

- Неравноправные взносы стран-членов ЕС в бюджет союза. Великобритания

считается одной из развитых стран ЕС, таким образом она платит большие взносы, при этом не получая ощутимых преференций, как считают простые обычные обыватели страны. В целом Великобритания занимала 4 место по величине суммы в общеевропейскую казну.

- Единый рынок. Общий рынок стал не так выгоден Великобритании, как было двадцать-тридцать лет назад.

Иначе говоря, причины в целом заключается в контроле и деньгах.

Немаловажной причиной стала и потеря национальной идентичности, народ Британии ценят культурную и социальную самобытность своего государства.[1]

Однако подобное положение дел совсем не устроило Шотландию. Брексит стал для шотландского народа «ярмом», которое они отказываются нести.

В Шотландии народ встретил брексит негативно. В день выхода Великобритании из состава ЕС проходили многочисленные пикеты и демонстрации. Многие здания по стране освещались вечером в цветах европейского флага.

Шотландское правительство решило оставить перед входом в парламент европейский флаг, который находился там с 2004 года.

Подобные демонстрации протеста выхода из ЕС проходили по всей стране, и резко контрастировали с праздничной атмосферой на территории Британии. [2]

Шотландия в целом никогда не поддерживала брексит. Это было отмечено не только во время референдума 2016 года, когда Шотландия четко решила остаться в ЕС, она также выступала против брексита на всех последующих выборах. Во всех соцопросах, проводимых на территории Шотландии, большинство голосов было против выхода из ЕС. Брексит в конечном итоге актуализирует жизненно важные проблемы конституционного строя Великобритании, да и в целом будущего Великобритании как государства.

Вопрос независимости всегда стоял в центре внимания шотландской политики, в данном случае можно сказать, что брексит не поднял этот вопрос, а скорее обострил характер и остроту политических дебатов по данной ситуации. Многие годы вопрос независимости приводил к неопределенности, теперь же Шотландии придется делать выбор между Великобританией и Европейским союзом. Многие юнионисты видят Шотландию членом обоих союзов. Однако, как показали недавние демонстрации, такой вариант отпал.[3]

Шотландское правительство целиком сосредоточено на необходимости проведения

нового референдума о независимости. В первую очередь за данную инициативу выступает Шотландская национальная партии и шотландские зеленые.[4]

Проведение референдума требуют и обычные жители Шотландии. Фактически парламент уже проголосовал в поддержку этой инициативы в 2020 году.

Шотландия, на протяжении всего того времени что решался вопрос выхода Великобритании из ЕС, обрела особый имидж – ярого адепта Европейского союза. Это выражается в всесторонней поддержке правил и принципов ЕС.

Так же актуален вопрос более детального продумывания обретения независимости Шотландии, так как обостряется вопрос о том, как государство собирается справляться с реальными последствиями своего вхождения в ЕС в качестве маленького государства и каким типом государства – члена ЕС она планирует стать.

Европейская политика, в современное время, держится на интересах и власти. В случае реального обретения независимости, Шотландии будет тяжело соответствовать статусу самостоятельного игрока. В нынешней ситуации можно даже сказать, что Шотландия ослабела, оставшись одновременно без членства в ЕС и статуса отдельного государства. Вопрос обретения независимости также может стать камнем преткновения для выстраивания политических отношений. Для остальных государств-членов ЕС Шотландия может стать перспективным партнером, но они также могут учитывать и интересы Великобритании, проявляя уважение к ее конституции и закрепленной в ней территориальной целостности. Шотландии в данном случае придется найти оптимальный выход из данного вопроса.[5]

Для того чтобы сохранить связи с другими членами ЕС, Шотландии нужно сделать упор на практическое сотрудничество в общих сферах интересах стран. Для подобной перспективы у Шотландии достаточно ресурсов, таких как – возобновляемые источники энергии, новые технологии, нефть и другое.

Так же шотландское правительство в день брексита инициировало свою новую европейскую стратегию «Стратегическая повестка дня Европейского союза на 2020-2024 годы: перспективы Шотландии». Данная стратегия регламентирует 4 общих приоритета, которые определяют участие Шотландии в жизни ЕС: климатические вызовы, демократия и ценности, умная экономика и благосостояние населения. Этот документ является основным мощным фундаментом для будущего сотрудничества и партнерства. Стратегия

гарантирует, что Шотландия рассматривает перспективу отношений с ЕС не только как потребителя, но и вкладчика. [6]

Стратегия 2020-2024 уже реализуется в рамках ЕС. По данной инициативе развернуты представительства - «Инновационно-инвестиционные центры», которые были открыты в Берлине, Париже и Дублине.

Но все же стоит отметить, что Шотландии нужно наращивать партнерские связи с Евросоюзом.

В целом правительство Шотландии рассчитывают в ближайшее время определить дату второго референдума о независимости, а также другие актуальные вопросы, которые будут вынесены на голосование. Проводимые опросы среди населения дают противоречивые данные: одни говорят, что, до 52% шотландцев могут поддержать независимость от Лондона, другие же что, для 70% данный вопрос не является приоритетным. Экономические эксперты дают анализ что, амбиции Шотландского правительства могут стать настоящим ударом для экономики Шотландии, которая более трех веков входила в состав королевства.[7]

Опросы, проводимые в последние месяцы, наглядно показывают шаткость единого и твердого мнения среди населения. Процент поддержки идеи о независимости колеблются от 50% до 58%. На результаты опроса так же имеют влияние и сама формулировка вопроса. А также привилегия социальной и экономической жизни Великобритании на фоне ЕС. Однако, с другой стороны, жители Шотландии недовольны центральной властью, эксцентричным премьером Борисом Джонсоном, коронавирусными ограничениями, итогами переговоров с ЕС для шотландской рыболовецкой отрасли.

Ко всему прочему нужно добавить и сильное чувство национальной идентичности шотландцев, а также недовольство от выхода из Евросоюза. Все это имеет большое влияние на актуализацию проведения референдума о независимости Шотландии.

В 2014 году на референдуме задавался один вопрос - должна ли Шотландия стать независимой страной? Тогда «да» ответили 44,7%, «нет» — 55,3%.[8] Однако в дальнейшем вопрос выхода Великобритании из ЕС поменял расклад сил и голосов. Великобритания в целом проголосовала за выход из ЕС, в то время как шотландцы голосовали против. За отделение голосовали лишь 38%, за сохранение статус-кво — 62%. В последствии брексита, шотландцами была выдвинута инициатива проведения «шексита». Данный термин хоть и

не вошел в обиход как официальное заявление, но все же встречается во многих британских и европейских статьях СМИ. Последствия «шексита» по прогнозам экспертов могут оказаться не менее разрушительными, чем у брексита.

Экономические эксперты Лондонской школы, просчитали что, выход Шотландии из состава Соединенного Королевства может обойтись потерей в £11 млрд. Также, они отметили что, в данном случае нет гарантий сохранения фунта стерлингов в качестве национальной валюты. По подсчетам экономистов, реальный доход на душу населения упадет.

Само же правительство Великобритании негативно относится к проведению референдума. По словам премьер-министра Бориса Джонсона, данная инициатива не имеет прерогатив в нынешнее время. «Мне не кажется правильным бесконечно говорить еще об одном референдуме. На мой взгляд, правительство Шотландии не показало себя с блистательной стороны в вопросе создания рабочих мест, образования, борьбы с преступностью и наркоманией. Именно на этих темах нужно заострить внимание и, разумеется, на ситуации с пандемией — это то, чего хотят люди. Те же самые люди, которые продолжают рассуждать о референдуме, еще несколько лет назад, в 2014 году, утверждали, что подобное голосование должно проходить лишь один раз в поколение. Я действую в соответствии с тем, что они говорили тогда» - отметил Борис Джонсон на вопрос о будущей инициативе проведения референдума о независимости Шотландии. [9]

В свою очередь же Никола Стёрджен – первый министр Шотландии, четко дала понять, что референдум в любом случае состоится. И даже если он не будет иметь юридической силы, Лондон может столкнуться с необходимостью учитывать его итоги.[10]

В целом, подводя итоги анализа ситуации, можно спрогнозировать несколько сценариев развития вопроса независимости Шотландии.

Первый сценарий, в случае если референдум состоится, можно определить, что все же голосование пройдет в пользу отделения Шотландии от Великобритании. В данном случае Шотландия гарантированно вернется в состав Европейского союза, однако стоит все же отметить, что данный фактор может стать проблематичным для новоявленного суверенного государства как с политической, так и с экономической стороны.

Второй же сценарий заключается в том, что референдум не будет проведен по ряду причин: Великобритания может не дать разрешения на проведение референдума, или

развитие ситуации приведет к тупиковому финалу, по которому вопрос останется в подвешенном состоянии.

Список использованной литературы

1. Яковенко А. Европейская дилемма Великобритании. 05.04.2015. Доступ: http://globalaffairs.ru/ diplomacy/Evropeiskaya-dilemma-Velikobritanii-17400
2. «Брюссель не будет возражать»: сможет ли Шотландия добиться независимости от Великобритании и остаться в ЕС [Электронный источник]. - Режим доступа: https://russian.rt.com/world/article/669912-shotlandiya-nezavisimost-velikobritaniya
3. Ананьева Е.В. (2015). Референдум о независимости Шотландии: цепная реакция. Сепаратизм в политической жизни современной Европы. Доклады Института Европы. №318. М.: Институт Европы.
4. Scottish government publishes independence referendum bill [Electronic resource]. - Mode of access: https://www.theguardian.com/uk-news/2019/may/29/scotland-publishes-second-independence-referendum-bill
5. McCrone D. Understanding Scotland. The Sociology of a Nation. 2nd ed. London and New York, Routledge, 2001. 216 p.
6. Энтони Саламон До свидания // IPG 21.02.2020. URL: https://www.ipg-journal.io/rubriki/evropeiskaja-integracija/do-svidanija-1002/
7. Ларионова М., Сахаров А., Шелепов А. Великобритания после «Брексита»: ее отношения с ЕС и будущее в многосторонних институтах // Экономическое развитие России. — 2016. — №7. — С. 50-54.
8. Перегудов С., Семененко И. Референдум о независимости Шотландии и проблемы британской государственности. Мировая экономика и международные отношения, 2015, № 3, сс. 64-75. https://doi.org/10.20542/0131-2227-2015-3-64-75
9. О.Демидова Джонсон отклонил просьбу Шотландии провести референдум о независимости // Made for minds 14.01.2020. URL: https://p.dw.com/p/3WBLs
10. И. Александорова Стерджен намерена добиваться нового референдума о независимости Шотландии// Euronews 24.01.2021. URL: https://ru.euronews.com/2021/01/24/scotland-referendum

Proceedings of IYSC, (2022), vol. 11

Journal homepage: http://journals.sdu.edu.kz/index.php/iysw

USAGE OF READING STRATEGIES BY KAZAKHSTANI EFL STUDENTS

M. Sanatkyzy[1], A. K. Kitibayeva[2]

[1]*Suleyman Demirel University, Kaskelen, Kazakhstan*

[2]*E.A.Buketov University of Karaganda, Kazakhstan*

Abstract

Reading comprehension is considered as the basis of learning in various educational programs for the development of writing, vocabulary, and grammar. Therefore, foreign language instructors should teach pupils strategies for improving their reading skills. This article gives a general overview of how learners regulate learning strategies. It explores the use of reading strategies, elucidates strategies for high-frequency use as well as low-frequency use, and discusses their implications for classroom teaching. The data were collected using a questionnaire that included 40 Likert questions on a five-point scale, and participants were asked to circle on a scale from "Never" (1) to "Always" (5), depending on their position. The results show that students' average strategy usage is in the medium range, indicating that they are not regular strategy users. The study's findings suggest that instructors and curriculum developers should pay more attention to strategies for reading instruction. The results of the study might be helpful for informing the language teachers about the merits of strategy-based instruction and how helpful it can be in instructing language skills particularly reading skill.

Keywords: reading comprehension, strategy-based instruction, foreign language reading, strategic reading, reading instruction, learning strategies, teaching reading skills, English as Foreign Language (EFL) learners.

Introduction

A guaranteed way to help students retain the content is to teach reading skills in English lessons. If students do not have a repertoire of reading abilities that can be applied to any text, they are being shafted in their education. To teach students to read successfully, teachers should ensure that they are not merely producers of information on a particular text, but also teachers of reading strategies.

Many teachers already include skill development to some extent in their classrooms; however, taking some time to explain and actively involve students in the process will ensure that skill development remains at the forefront of learning. As a result, students will not only improve their reading skills but also grasp how to become better readers. Children who are taught comprehension strategies grow into flexible thinkers who can apply a number of strategies to a range of texts, allowing them to better comprehend those texts. In other words, the more strategies

the reader knows, the more information will be obtained from the text.

The aim of the article is to discuss how learners regulate reading strategies, because good reading skills are essential for students learning every foreign language. In comparison to other ways of learning, most scholars believe that reading has the potential to increase learner interaction, knowledge retrieval, and information retention. Reading comprehension is one of the key goals specified in many education programmes [1], hence reading plays an essential part in L2 curricula. In several instructional methods to enhance vocabulary, writing, grammar, and general language courses, reading comprehension is seen as the foundation of teaching [2].

According to the National Assessment of Educational Progress, 22% of pupils have major difficulties interpreting texts at even the most basic level [3]. These difficulties may be due to instructors' misunderstanding that reading a material smoothly and without mistakes equates to easy comprehension [4]. As a result, these teachers avoid teaching useful skills that learners need to figure out the text, rather focusing solely on the content of the text [5]. Since reading comprehension is a complex, multidimensional interplay between text, reader, context, and activity, it necessitates a supportive educational atmosphere to encourage strategic reading [6].

The object of this study is to explore the use of reading strategies, and clarifying the strategies for high and low frequency use. Students who discover how to get around the language learning task will find it much simpler to study a foreign language. As a result, in order to assist pupils in learning a language more successfully and efficiently, teachers might teach them specific language-learning strategies. Foreign language teachers should teach students strategies that they can use to improve their skills. Teachers of foreign languages should give pupils strategies for improving their skills. Understanding how students grow as strategic learners, as well as how the instruction of strategies combines naturally with other components of teaching reading, requires an understanding of the many instructional methodologies used in classrooms [7].

This article gives a general overview of how learners regulate their learning. Struggling readers require more instruction in comprehension skills since they are unlikely to find them on their own [8]. Students showed a good attitude toward strategy training, and it was successful in improving their academic reading comprehension [9]. Although many reading study focuses on young readers or college students, little is known about secondary school students' comprehension techniques for constructing meaning from complicated texts [6].

This article is a contribution to correcting this situation by questioning high school students

and determining what strategies students use. Summing up, this study is aimed at analyzing the current use of reading strategies by Kazakh EFL students.

Data collection tool and Method

In compliance with the General Data Protection Requirements (GDPR), the study took into account all ethical research requirements. The survey was completely anonymous, and participation is entirely voluntary. The study participants were 58 students who study in the 11th grade of secondary school. The age of the participating respondents ranged from 16 to 17 years, by gender, 32 male and 26 female students.

The method of data collection in this study is an online questionnaire conducted in November 2021 via Google Forms. Participants received instructions on how to complete the questionnaire. Students were informed about the purpose of the survey and asked to freely express their opinion. The usage of reading strategies by students was investigated in this study. The study's questionnaire included 40 Likert questions on a five-point scale, and participants were asked to circle on a scale ranging from Never (1) to Always (5) depending on their position. The data was collected, and the mean of every item were calculated.

Results and Discussion

According to the findings, students' average strategy usage is in the medium range, indicating that they are not regular strategy users. Items with a mean of 3.5 or above are considered high-use, whereas items with a mean of 2.5 or lower are considered low-use. Those in the middle are classified as medium range.

Table 1 summarizes ten high-frequency strategies. According to the answers majority of the students predict what a text is about according to its title, adjust the prediction about the text while reading, use context clues to understand the meaning of words, and use graphs, tables, charts in text to increase understanding.

Reading strategies	M
Scanning for highlighted words or expression	3,58
Asking how the main idea/purpose is related to previous paragraph	3,49
Focusing on meaning, not form	3,40
Read silently	3,35
Visualizing	3,28

Reviewing to summarize text meanings	3,21
Use graphs, tables, charts in text to increase understanding	3,19
Prior knowledge (Relating meaning to what is already known)	3,68
Predicting	3,75
Summarizing the main idea of a text after reading	3,62

Table 1. Strategy Use: High Frequency

Table 2 presents eight low-frequency use strategies, among which such strategies as drawing graphs and tables to help understand the text, summarizing the main idea of a text after reading, having a reading plan, and reading English newspapers, magazines or books after class.

Reading strategies	M
Self-questioning	2,37
Reading aloud	2,31
Self-test after reading	2,18
Paraphrase to better understand the text	2,15
Planning	1,93
Reading English newspapers, magazines or books after class	1,86
Taking notes	1,72
Draw graphs and tables to help understand the text	1,65

Table 2. Strategy Use: Low Frequency

Conclusion

This study investigates Kazakh secondary school students' use of reading strategies. Although the sample of the study is not wide and large, the study gives an idea of the overall picture of the use of the strategy among schoolchildren in Kazakhstan. The results of the survey reveal that pupils are unaware of "strategies," emphasizing the importance of strategy-based training in the classroom.

The study's implication is that instructors and curriculum creators should pay greater

attention to strategy-based reading education. This article considers only the case of one Kazakh school in a small group of pupils, and it would be more useful to evaluate and analyze the results of primary schools where children need more constant support, and rural schools from remote regions. In Kazakhstani context vocabulary, the meaning of phrases, paragraphs, and texts, as well as reading skills such as scanning and skimming, are the primary emphasis of teachers. However, via strategy-based training, greater emphasis should be placed on goal-oriented and strategic reading.

References

1. Fahim M., Sa'eepour M. (2011). The Impact of Teaching Critical Thinking Skills on Reading Comprehension of Iranian EFL Learners. Journal of Language Teaching and Research. doi:10.4304/jltr.2.4.867-874
2. Mikulecky, B. S. (2008). Teaching reading in a second language. London: Pearson.
3. Denton C. A., Wolters C. A., York M. J., Swanson E., Kulesz P. A., Francis D. J. (2015) Adolescents' use of reading comprehension strategies: Differences related to reading proficiency, grade level, and gender. Learning and Individual Differences. Volume 37, Pages 81-95, ISSN 1041-6080. https://doi.org/10.1016/j.lindif.2014.11.016
4. Edmonds M. S, Vaughn S., Wexler J., Reutebuch C., Cable A., Tackett K. K, Schnakenberg J.W. (2009). A synthesis of reading interventions and effects on reading comprehension outcomes for older struggling readers. Review of Educational Research, 79(1), 262–300. 10.3102/0034654308325998 [PMC free article][PubMed] [CrossRef] [Google Scholar]
5. Alber-Morgan S .R., Matheson R. E., Anderson L. L., Martin C. M. (2007). Effects of repeated readings, error correction, and performance feedback on the fluency and comprehension of middle school students with behavior problems. The Journal of Special Education, 41(1), 17–30. 10.1177/00224669070410010201 [CrossRef] [Google Scholar]
6. Brown, R. (2017). Comprehension strategies instruction for learners of English: Where we have been, where we are now, where we still might go. In S. E. Israeli (Ed.), Handbook of research on reading comprehension (pp. 543–567). New York, NY: The Guilford Press. Israeli, S. E. (2017). Preface. In S. E. Israeli (Ed.), Handbook of research on reading

comprehension (pp. xii–xviii). New York, NY: The Guilford Press.

7. Brevik, L. M. (2017). Strategies and shoes: Can we ever have enough? Teaching and using reading com- prehension strategies in general and vocational programmes. Scandinavian Journal of Educational Research, 61(1), 76–94. https://doi.org/10.1080/00313831.2015.1075310.
8. Pilonieta, P. (2010). Instruction of research-based comprehension strategies in basal reading programs. Reading Psychology, 31, 150-175.
9. Zhang, L. J. (2008). Constructivist Pedagogy In Strategic Reading Instruction: Exploring Pathways to Learner Development In the English As a Second Language (ESL) Classroom. Instructional Science. doi: 10.1007/s11251-007-9025-6., 36(2). https://doi.org/10.1007/s11251-007-9025-6

Proceedings of IYSC, (2022), vol. 11

Journal homepage: http://journals.sdu.edu.kz/index.php/iysw

ИСПОЛЬЗОВАНИЕ СТРАТЕГИИ ЧТЕНИЯ КАЗАХСТАНСКИМИ УЧЕНИКАМИ, ИЗУЧАЮЩИМИ АНГЛИЙСУИЙ ЯЗЫК КАК ИНОСТРАННЫЙ ЯЗЫК

Д. Азаматова

Казахский национальный университет имени аль-Фараби, Алматы, Казахстан

Аннотация

Понимание прочитанного рассматривается как основа обучения в различных учебных программах для развития словарного запаса, письма, грамматики, общих языковых курсов. Поэтому преподаватели иностранных языков должны обучать студентов стратегиям, которые они могут использовать для улучшения своих навыков. В этой статье дается общий обзор того, как учащиеся регулируют стратегии обучения. В нем исследуется использование стратегий чтения, разъясняются стратегии как высокочастотного, так и низкочастотного использования, а также обсуждаются их последствия для преподавания в классе. Данные были собраны с помощью вопросника, который включал 40 вопросов Лайкерта по пятибалльной шкале, и участников попросили обвести по шкале от "Никогда" (1) до "Всегда" (5), в зависимости от их положения. Результаты показывают, что среднее использование стратегии студентами находится в среднем диапазоне, что указывает на то, что они не являются постоянными пользователями стратегии. Вывод исследования заключается в том, что стратегии обучения чтению должны уделять больше внимания учителям и разработчикам учебных программ. Результаты исследования могут быть полезны для информирования учителей иностранных языков о преимуществах обучения, основанного на стратегии, и о том, насколько это может быть полезно для обучения языковым навыкам, особенно навыкам чтения.

Ключевые слова: понимание прочитанного, обучение на основе стратегии, чтение на иностранном языке, стратегическое чтение, обучение чтению, стратегии обучения, обучение навыкам чтения, изучающие английский язык как иностранный язык.

Культурные аспекты целей устойчивого развития ООН

Проблема взаимосвязи культуры и устойчивого развития является одной из актуальных тем нашего времени. Данную тему поднимают на различных дискуссия, звучит в выступлениях культурологов, политиков, исследователей экологов. На самом деле культура, природа, человек и устойчивое развитие взаимосвязаны и влияют друг на друга: окружающая среда влияет на культуру, культура влияет на среду, такая же ситуация с системой взаимодействия человека с культурой. При этом человека можно назвать главенствующим звеном в данной системе, как так человек создает культуру и с помощью культуры может влиять на окружающую среду. Однако до современного периода культура

не рассматривалась в рамках устойчивого развития, как значимая часть процесса реализации концепции, ее обсуждали только в более узких кругах.

Сегодня все изменилось, без культуры продвижении концепции устойчивого развития не рассматривается, она стала частью этого процесса. Конечно, в действующей стратегии развития «Повестка дня до 2030 года» культурное измерение не вошло как отдельное измерение наряду с экономическим, экологическим и социальным, поэтому возникают некоторые сложности. Так, у культуры нет одного определения в рамках устойчивого развития. Понятие «культура» имеет широкий объем значений. С одной стороны, это очень затрудняет его определение, а с другой — делает его определение очень важным, чтобы избежать неточностей или смешения разных значений.

По Пакалену, именно слабое различие отдельных интерпретаций культуры делает понятие расплывчатым и трудным для понимания, что может быть причиной маргинализации роли культуры, когда речь идет о понятии устойчивого развития [1]. Исходя из этого, в ходе исследования были определены два определения термина – более узкое и более широкое.

В контексте концепции устойчивого развития узкое определение термина «культура» может относиться к культурному наследию или различным видам художественной деятельности. В повседневном разговоре мы часто понимаем культуру как эквивалент чего-то более возвышенного в духовной сфере. Более узкое определение этого термина относится к так называемому «высокому искусству» — опере, классической музыке, изобразительному искусству и т. д. В свою очередь, культура охватывает все традиционные элементы, являющиеся частью культурной политики – театр, кино, музыка, архитектура, литература, музеи и т. д. [2]. Другими словами, когда мы используем более узкое значение термина, мы видим материальное или нематериальное культурное наследие; продукт или деятельность, связанные с индустрией искусства и/или культуры.

В 1995 году ЮНЕСКО опубликовал определение культуры как «совокупность отличительных духовных, материальных, интеллектуальных и эмоциональных особенностей общества или социальной группы. Она включает в себя, помимо искусства и литературы, образ жизни, способы совместного проживания, основные права человека, системы ценностей, традиции и верования» [3]. То есть культура выражает различные значения и ценности не только в искусстве и науке, но также в отношении

институционального и повседневного поведения.

Один из первых сторонников культурного аспекта устойчивого развития – Джон Хоукс предлагает более глубокий взгляд на этот термин. По его словам, культура включает в себя: наши ценности и стремления; способы, которыми мы развиваем, получаем и распространяем эти ценности и образ жизни, порожденный этими процессами: «Наша культура воплощает смысл, который мы даем нашей жизни; оно основано на наших общих ценностях и на том, как мы принимаем наши различия; она связана с тем, что действительно важно для людей и сообществ: отношениями, памятью, опытом, идентичностью, происхождением, надеждами и мечтами во всем их многообразии. Прежде всего, наша культура выражает наше видение будущего: что мы хотим дать будущим поколениям. Наша культура связывает наше настоящее с нашим прошлым, а также с будущим, которое мы себе представляем. Через культуру мы устанавливаем контакты, сети смыслов и ценностей, а также сети дружбы и интересов, объединяя нас во времени, пространстве и сообществе. Наша культура описывает то, как мы рассказываем друг другу наши истории, как мы понимаем себя, помним, кто мы есть, представляем, кем мы хотим быть, как мы отдыхаем, как мы празднуем, как мы спорим, как мы воспитываем наших детей, пространство. мы создаем для себя. Наша культура является выражением нашей цели быть счастливым, принадлежать, выживать и в основном быть творческим.» [4]

Хоукс также определяет главную задачу культуры, что является социальное создание смыслов, которое представляет собой наиболее важный человеческий акт и должно пониматься и поощряться в процессе организации сообщества во всех сферах — экономической, социальной и экологической. Этот тезис о культуре как всеобъемлющей основе политики устойчивого развития, как четвертом столпе устойчивости, связан с разнообразием, творчеством и процветанием.

В докладе Брундтланд устойчивое развитие определяется следующим образом: «Устойчивое развитие — это развитие, которое удовлетворяет потребности настоящего, не ставя под угрозу способность будущих поколений удовлетворять свои собственные потребности» [5]. Доклад Брундтланд содержит аргументы касательно культуры в рамках устойчивого развития. Тот факт, что он сейчас стоит на повестке дня как часть самого определения устойчивости, связан с ролью культуры как форума для открытого, ориентированного на диалог человеческого взаимодействия. В рамках продолжения

процессов «Культура 21», «Рио + 20» и др. В 2014 г. Генеральный секретарь ООН представил доклад о роли культуры в устойчивом развитии. В ходе этого процесса утверждалось, что культура наделяет человечество творчеством, критическим мышлением, сочувствием, доверием, готовностью идти на риск и взаимным уважением — и это лишь несколько важных черт. В устойчивом обществе искусство и культура позволяют людям принимать участие и помогать развитию общества. Другими словами, активная культурная жизнь способствует демократии и участию и создает предпосылки для хорошей жизни.

Следовательно, культурный аспект устойчивого развития связан с реализацией принципов искусства, межкультурного диалога и культурного разнообразия в международной, национальной и региональной политике развития. По этой причине можно говорить о работе над двойным подходом к культуре в своей стратегии поддержки устойчивого развития. С одной стороны, организации, страны разрабатывает политику, направленную на сам культурный сектор, отвечающую потребностям адекватного законодательства, обучения культурному администрированию, посредничеству и управлению культурными ресурсами. Под сектором культуры подразумевается наследие, творчество, индустрия культуры, ремесла и культурный туризм. Следует уточнить, что кроме материального культурное наследие может быть и нематериальным – т. е. это практики, знания, традиции и опыт, передающиеся из поколения в поколение и помогающие сохранить чувство принадлежности и идентичности данному сообществу. Примером нематериального наследия из Казахстана, которое уже занесено в список мировых шедевров ЮНЕСКО, являются Казакша курес, юрта, кюй, айтыс, соколинная охота, наследие деда Коркыт ата и многое другое [6].

С другой стороны, например, ЮНЕСКО стремится обеспечить учет культуры во всех стратегиях развития, особенно в тех, которые связаны с образованием, наукой, коммуникациями, окружающей средой и социальной сплоченностью.

Важно отметить, что культурное измерение связано с приобретением гибкости и согласованием политики развития с местным контекстом (нравами, моделями общения и жизни, ценностями и обычаями местного населения) того места, где они будут применяться. В каждом менталитете или понятии уже есть определенная культурная предпосылка – тот, кто наблюдает мир, отражает свой взгляд на предложенную им идею. Концепция устойчивого развития также имеет уже заложенную перспективу, определенное

понимание того, что такое «развитие». Обычно это точка зрения «западной» культуры.

Но когда эта точка зрения навязывается на местное сообщество, это может также противоречить принципам устойчивого развития, поскольку оно (сообщество) становится зависимым от внешних ресурсов, новых ценностей и не является жизненно важным и способным поддерживать свое равновесие и развитие во времени. т.е. культурный аспект устойчивого развития в этом случае мог бы помочь путем повышения осведомленности вовлеченных субъектов о том, что они не являются лидерами, руководящими в соответствии с заранее определенными абстрактными принципами.

Баланс между соблюдением принципов устойчивого развития, соблюдением и учетом местных особенностей является выражением чувствительности к культурному аспекту. В противном случае существует риск того, что стратегия устойчивого развития будет воспринята местным населением как искусственно введенная нежизнеспособная претензия на применение «чудесной» формулы развития. Таким образом, за такими формулировками, как «интеграция принципов культурного разнообразия» во все государственные политики, механизмы и практики, на самом деле стоит осознание культурных различий, знание потребностей и возможностей граждан определенной страны или города «усвоить» определенное видение развития, а также активное вовлечение местного населения в принятие решений.

Есть ряд примеров политики развития (не обязательно устойчивой), которая не соответствует ни местному контексту, ни общей культурной стратегии поселения. Актуальным примером такого несоответствия является строительство огромного для масштабов Чипровцев (Болгария) стадиона за более чем 5 миллионов левов в рамках Программы развития села [7]. Сама по себе строительная инициатива хороша, но в контексте города это демонстрирует неустойчивый подход, поскольку стадион таких размеров слишком велик, чтобы удовлетворить потребности местного населения. Однако в городе недостаточно гостиничных мест для приема гостей города для участия в возможных мероприятиях на стадионе. Сам проект также не предусматривает строительство дополнительных отелей или гостевых домов для приема внешнего потока посетителей. Эти масштабные инвестиции не связаны с другой спецификой Чипровцев – регион славится многовековой традицией ковроткачества, которая из-за отсутствия инвестиций находится под угрозой исчезновения. Местная школа ковроделия, также с давними традициями,

испытывает финансовые проблемы, и становится очень трудно обучать молодых людей ремеслу. Следовательно, с одной стороны, проект стадиона не учитывает культурную специфику региона – традиции ковроткачества – тем самым демонстрируя отсутствие у местных властей общего культурного видения для сохранения местной идентичности и обычаев. С другой стороны, строительная инициатива вовсе не является примером устойчивого развития, так как не опирается на существующие ресурсы города, а создает новые градостроительные проблемы, которые необходимо решать позже.

Примером европейской политики устойчивого развития в сфере культуры является инициатива «Культурная столица Европы» [8]. Инициатива проекта принадлежит греческому министру культуры Мелине Меркури и министру культуры Франции Жаку Лану. Европейское культурное событие началось в 1985 году, и с тех пор более 40 городов были названы культурными столицами. Согласно Статье 4 Решения № 1622/2006/EC, одним из основных критериев, по которым оценивается кандидат в культурную столицу, является то, что культурная программа должна быть устойчивой – быть неотъемлемой частью долгосрочного культурного и социального развития города. Причиной этого критерия является поощрение городов к разработке программ с долгосрочными результатами. Идея назначения культурных столиц состоит в укреплении культурных связей между европейскими нациями и поддержке локальных креативных индустрий. Культурные столицы привлекают огромное количество туристов, в течение всего года там организуются фестивали, выставки, концерты, ярмарки. Культура в городе просто кипит, а местные жители и туристы во всем этом варятся. Одной из целей проекта является привлечение местных жителей к организации городского пространства так, как удобно и по душе им самим. В городе Пльзень в Чехии, который был культурной столицей в 2015 году, горожане запустили инициативу «Foster the City» и обозначили публичные места, которые нуждались в благоустройстве. Затем они разработали для каждого из них план действий, каждый(-ая) выбрал(-а), в каком проекте ему/ей хотелось бы поучаствовать, и сделали все необходимое при экспертной поддержке проектной команды культурной столицы. Таким образом, хотя тот или иной город может быть культурной столицей Европы в течение полугода, подготовка проектов начинается за годы до присвоения звания, и художники должны быть вовлечены в развитие места после окончания номинации.

Таким образом, можно сказать, что культурные аспекты устойчивого развития

зависят от того, что та или иная сторона подразумевает под термином «культура». Политика, связанная с искусством, занимает важное место в рамках культурной политики, но большее место имеет более широкое понимание культуры и включает защиту и поощрение граждан в использовании их права. свободы слова, а также их доступ к информации и ресурсам. Политика, направленная на помощь искусству, поддерживает развитие высокого, профессионального искусства. Тем не менее, он упускает из виду важность вовлечения всех граждан в создание культуры и их активного участия в принятии решений - деятельности, которая улучшает качество жизни и создает чувство удовлетворения, согласованности и процветания в сообществе.

Список используемой литературы

1. Packalen, Sture (2010) Culture and Sustainability in Corporate Social Responsibility and Environmental Management 17, 118–121 Wiley InterScience, (www.interscience.wiley.com)
2. Darlow, A. (1996) Cultural Policy and Urban Sustainability: making a missing link?, in Planning Practice and Research, Vol. 11, No. 3
3. UNESCO (1995). The cultural dimension of development: towards a practical approach, Culture and Development Series, Paris, UNESCO Publishing
4. Hawkes, Jon (2001) The fourth pillar of sustainability: Culture's essential role in public planning
5. Наше общее будущее: Доклад Международной комиссии по окружающей среде и развитию (МКОСР) : https://www.un.org/ru/ga/pdf/brundtland.pdf
6. Центральная Азия: Элементы в Репрезентативном списке нематериального культурного наследия человечества, UNESCO (http://ru.unesco.kz/elements-on-the-representative-list-of-the-intangible-cultural-heritage-of-humanity)
7. 5 million BGN stadium is being built in Chiprovtsi, 24 Hours Daily, 21.06.2013, http://www.24chasa.bg/Article.asp?ArticleId=2079872
8. Культурная столица Евросоюза в 2020 году // https://angel-a.su/finansy/kulturnaya-stolitsa-evrosoyuza-v-2020-godu.html