

## INNOVATIVE APPROACHES TO THE IMPLEMENTATION OF MOOCS IN HIGHER EDUCATION

**B.B.Buribaev, G.T. Kalidollina, B.T.Barat\*, G.U.Utegen**

Al-Farabi Kazakh National University, Almaty, Kazakhstan,

e-mail: bekzat.barat@mail.ru

This article is devoted to the topic of informatization in education. In the context of globalization, the modern education system is undergoing significant changes. The concepts of continuous learning and openness, accessibility are becoming a reality thanks to massive open online courses (MOOCs). The article provides a brief description of the principles of operation of popular educational platforms such as Coursera, edX and others. The MOOC variant proposed by the authors of the work on programming in the state language, which is currently used in the process of studying at the university, is considered. The advantages and disadvantages of e-learning are analyzed.

**Keywords:** higher education efficiency, massive open online courses (MOOCs), blended learning technology, E-Learning, online learning.

## ЖОҒАРҒЫ ОҚУ ОРЫНДАРЫНДАҒЫ БІЛІМ БЕРУ ПРОЦЕСІНЕ ЖАОК-ТАРДЫ БЕЛСЕНДІ ТҮРДЕ ЕНГІЗУ ЖОЛДАРЫ

**Б.Б. Бөрібаев, Г.Т. Қалидоллина, Б.Т. Барат\*, Г.У. Утеген**

әл-Фараби атындағы Қазақ Ұлттық университеті, Алматы, Қазақстан,

e-mail: bekzat.barat@mail.ru

Бұл мақала білім берудегі ақпараттандыру тақырыбына арналған. Жаһандану жағдайында қазіргі білім беру жүйесі айтарлықтай өзгерістерге ұшырауда. Үздіксіз оқыту және қолжетімділік тұжырымдамалары жаппай ашық онлайн курстардың (ЖАОК) арқасында шындыққа айналуда. Мақалада танымал білім беру платформаларының жұмыс принциптерінің қысқаша сипаттамасы келтірілген Coursera, edX, және т.б. Мемлекеттік тілде бағдарламалау бойынша жазылған жұмыстардың авторлары ұсынған ЖАОК нұсқасы қарастырылды, олар қазіргі уақытта университетте оқу процесінде қолданылады. Электрондық оқытудың артықшылықтары мен кемшіліктеріне талдау жасалды.

**Түйін сөздер:** жоғары білім тиімділігі, жаппай ашық онлайн курстар, E-Learning, аралас оқыту технологиясы, онлайн-оқыту.

## ПУТИ АКТИВНОГО ВНЕДРЕНИЯ МООК В ОБРАЗОВАТЕЛЬНЫЙ ПРОЦЕСС В ВЫСШИХ УЧЕБНЫХ ЗАВЕДЕНИЯХ

**Б.Б. Бөрібаев, Г.Т.Қалидоллина, Б.Т.Барат\*, Г.У.Утеген**

Казахский национальный университет имени аль-Фараби, Алматы, Казахстан,

e-mail: bekzat.barat@mail.ru

Данная статья посвящена теме информатизации в образовании. В условиях глобализации современная система образования претерпевает значительные изменения. Концепции непрерывного обучения и открытости, доступности становятся реальностью благодаря массовым открытым онлайн-курсам (МООК). В статье дается краткое описание принципов работы популярных образовательных платформ, таких как Coursera, edX и др. Рассмотрен вариант МООК, предложенный авторами работы по программированию на государственном языке, который в настоящее время используется в процессе обучения в вузе. Проанализированы преимущества и недостатки электронного обучения.

**Ключевые слова:** эффективность высшего образования, массовые открытые онлайн-курсы (МООК), электронное обучение, технология смешанного обучения, онлайн-обучение.

**Introduction.** Currently, electronic education is rapidly advancing. Educational institutions today offer online courses alongside thousands of various new technological methods. The goal of digitizing the educational process is to enhance the quality of education using innovative technologies tailored to each learner individually. In the initial stages of e-learning development, presenting educational materials effectively using modern information technology tools was sufficient. Recently, however, one of the comprehensive, systemic methods has come to the forefront, resulting from the creation of a unified educational information environment covering the entire learning process - Massive Open Online Courses (MOOCs) [1, 2].

Creating online courses requires specific knowledge and skills, such as pedagogical methods, course design, content development, adapting the course to the online format, and technical support. Depending on the course objectives, courses can be developed collaboratively by multiple educational institutions or as an individual project. The rapid development of

information technologies, especially the internet and communication tools, has expedited the growth of distance education, enabling educational institutions located in any part of the country to offer instruction across various fields.

The leading higher education institutions in our country have begun integrating such a distance education system into the learning process. Online courses significantly complement and deepen traditional academic education, making information more current and developing the practical skills of learners [3].

Our main goal in creating MOOCs is to enhance program efficiency despite the large number of users. This is beneficial for students who cannot afford to attend traditional educational institutions and for those who want to pursue additional education in their free time. Additionally, open online courses can be utilized for the advancement or retraining of professionals in various fields. User opinions on the e-learning course are diverse, and we have outlined the key ones in Table 1 [2].

Table 1 - Advantages and disadvantages of MOOC

Advantages of MOOC	Disadvantages of MOOC
Student can assess their knowledge and evaluate their achievements.	Lack of opportunity for individual communication between students and instructors.
Distance learning allows for saving money on further education.	Creating a new MOOC and improving it requires funding.
There is no need to go to a specific location at a particular time for learning.	The fact that the internet does not cover all territories is a significant obstacle.
Materials can be reviewed multiple times.	It will be challenging to ensure that educational materials correspond to the students' educational level.

The purpose of the study: to consider the process of creating MOOCs and their role in education, to analyze their advantages and disadvantages, to describe the effective aspects of the course work proposed by the authors. The object of research is the creation of mass open online courses in Kazakhstan, and the field of research is the process of creating open online courses and the work carried out at its practical stages. The importance of working in this field helps readers to better understand the process of creating massive open online courses, as well as their role in education. Online courses are useful in the field of education, including in the training of specialists in the field of technology,

and a wide audience interested in improving their professional skills.

Each year, our university publishes around thirty courses. According to the QS World University Rankings by Subject 2023, our university is among the top 200 educational institutions and guides the creation of MOOCs within unified educational institutions throughout Kazakhstan [4]. On October 1, 2015, the first open courses were launched by leading professors at Al-Farabi Kazakh National University, covering "Probability Theory" and "Physical Problems with Associate Professor V. Kashkarov". These courses were attended by students from the first and second

years of Al-Farabi Kazakh National University, high school students from Nazarbayev Intellectual Schools, and students from specialized physics-mathematics and secondary schools [3, 5].

**Materials and methods.** This study explores various methods for utilizing MOOCs, including ways to analyze and summarize scientific and methodological literature, works of domestic scholars, and their analysis. Throughout this analysis, existing experiences in creating online courses and implementing software solutions to enhance productivity are proposed. The practical significance of this research lies in the potential use of the article's material in studying the process of creating MOOCs and in seminars on the theory and methodology of teaching in secondary and higher educational institutions.

In the proposed work, alongside the examination of these methods for utilizing the education system, the significance of their application in the context of the modern educational environment is demonstrated. Methods of analyzing and summarizing scientific and methodological literature enable researchers and practitioners in the field of education to study current scientific works and develop new strategies and approaches to teaching. The analysis of the work of domestic scholars is a crucial stage in research

as it allows for the assessment of achievements and experiences of local experts in creating online courses and implementing modern technologies in the educational process [6]. There is every reason to believe that such an analysis involves studying concepts and methods adapted to the characteristics of the domestic education system, as well as examining advanced practices and successful conditions for the implementation of online education [7].

Massive Open Online Courses (MOOCs) have become increasingly popular in recent years, and consequently, numerous studies are conducted on this topic. Initially, the MOOC format emerged as part of blended learning technology, allowing students to watch lecture videos in a traditional format outside of class hours, complete tests, and quizzes. In addition to leading American universities creating online courses and integrating them into the educational process, the practice of licensing the right to use content developed by another university, such as MOOC, has emerged [8]. For example, San Jose State University in California initiated a pilot study using open online course content hosted on platforms like edX and Udacity within the flipped classroom format. In our country, unified online courses have been created, and their development in the national language ensures the continuous improvement of the learning process [9, 10] [Figure 1].

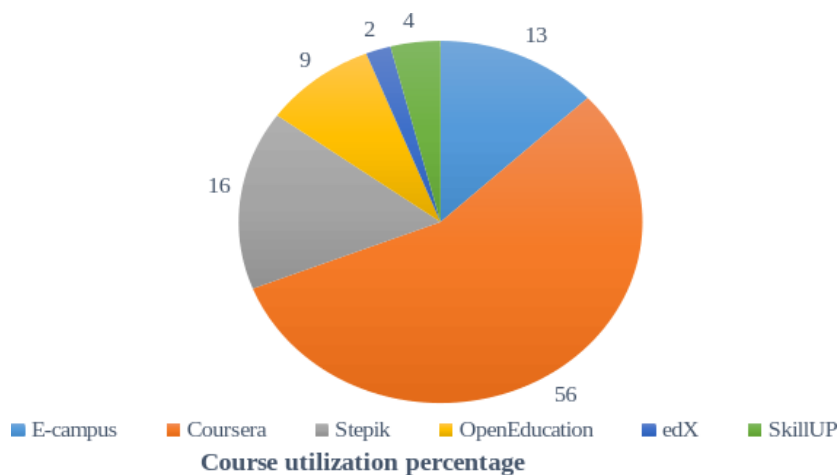


Figure 1 - The activity of using online courses on various platforms

E-campus, Coursera, Stepik are educational platforms that provide access to online learning in dozens of disciplines (humanities, technical fields, natural sciences), indicating the effectiveness of the online courses they offer (simultaneous enrollment

in multiple courses, up to three courses, is also provided). Thus, the most active providers of online courses are not educational platforms like Coursera, but organizations directly involved in publishing, such as publishers, book distributors, and digital publishing

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systems [11].

Currently, due to the possibility of recurring pandemic outbreaks, the issue of transitioning to remote learning and the effectiveness of creating online programs is considered highly relevant. Additionally, in the analysis of works by domestic scholars, the number of studies on the creation of online courses is growing, with a focus on leveraging the strengths of their main findings and recommendations. For example, in the following study [12], the authors discuss the current state of online education and its future. They explore the main trends in course development as well as issues related to their effectiveness, quality, and the accessibility of learning. Similarly, research on the creation of Massive Open Online Courses (MOOCs) [13] illustrates the stages of course development in Kazakhstan and other countries, highlighting their key features. This study addresses questions related to course design, the selection of teaching methods, and the application of new technologies. Based on the results of this work, efforts are being made to develop educational materials to adapt learners to various aspects of online learning and address the shortcomings of the MOOC system.

The analysis of the experience in creating online courses allows for the identification of successful strategies and approaches to the development and implementation of educational programs in the online environment. This may include research on the creation of various technological platforms and online courses, the use of interaction tools, the analysis of methods for evaluating the effectiveness of online education, and the examination of factors influencing the success of online courses, such as student motivation and teacher support [14].

The practical significance of our research lies in the opportunity for compact and convenient utilization of the materials obtained while studying the process of constructing an educational system. We have developed and implemented courses such as "Programming in C#", designed for the programming field [3, 4]. Users include high school students, and these courses can also serve as a basis for conducting seminars on the theory and methodology of teaching in secondary and higher educational institutions.

Overall, it is evident that this work has its place in the field of education, especially in the context of developing and implementing online courses in the field of programming in the state language. The research can serve as a source of information and inspiration for students, educators, and researchers interested in the

development of online courses and the use of modern technologies in the educational process.

At the same time, the scholarly work can serve as a foundation for conducting seminars and discussions on the topic of teaching theory and methodology. Discussing and analyzing this information will allow for an expansion of understanding the principles of effective teaching, as well as exchanging experiences and best practices in this field.

**Results and discussion.** From the point of view of teachers, the advantages of Jocs are the possibilities of good organization of the educational process and material. Teachers believe that the course contributes to the flexibility of teaching, which is achieved through different formats, and the improvement of the quality of both the JAP itself and the traditional course based on it, through the use of feedback from listeners.

Foreign Studies often state that for the full implementation of online courses in traditional teaching, teachers must improve the quality of work, in particular, they make the following requirements [15]:

- provide active administrative support to maintain the motivation of course teachers, i.e. authors, to work with the new format; also consider it necessary to carry out Resource, political and technological support;
- recognition of online courses (it is required to include them in the main workload of teachers, provide resources for conducting research within the framework of courses, devote time to the development of materials)
- the teacher must be prepared for the risks that come to his reputation by creating an online course.

The integration of MOOCs into the educational process of the university is the most important strategic task of modern higher education. The following ways of introducing the course into the educational process of the university can be distinguished:

1. Additional education: In this model, the MOOC is offered as additional resources to enrich the university curriculum. Students can choose a course according to their interests and take it along with the main subjects.
2. Integration into training courses: in this case, open online courses are included directly in the university curricula as an integral part of the disciplines. Specific lessons or modules of core subjects are replaced by a course that can complement traditional teaching with modern methods and content.

There are several types of integration of the course into the educational process of the university, each of

which has its advantages and limitations. The choice of the best form of integration depends on the goals of the educational institution, the needs of students and the available resources.

Creating massive open online courses is a complex and multi-stage process that includes several stages, including important ones: defining the goals and objectives of the course, developing a curriculum,

developing training materials, developing an MOOC platform, testing and launching the course, developing a knowledge assessment system [16]. That is, the online course program should contain information about the subject (the name of the open online course, the course abstract, information about the teacher, the results of the course, the target audience, etc. its general plan is presented in table 2 below.

Table 2 - MOOC creation plan

Open online course title	Online course name
1	2
Name of the discipline according to the curriculum, direction of training	Indicate the name of the discipline in accordance with the curriculum of the educational program. Cipher and name of the direction of preparation
Course Information	What is the course for, the purpose of the course, what is the purpose of learning-achieved
Course format	Course composition (video lectures, screencasts, presentations, questionnaires, etc.), total labor intensity of the course (number of credits / hours)
Course structure	Customized list of course topics
Competencies to be formed	-
Training results	-
Information about the authors of the course	Information about teachers (photo, full name, position telephone number, academic degree and title, email address)
Required level of training of trainees	What preliminary knowledge or skills will be required?

Table 3 - General structure of MOOC

The name of the section (subsection) and its brief description, which should reflect the content of the section	Types of evaluation of work in the Department. Set a "pass limit" for each type of assessment, for example 60%	Additional materials, links to external resources, images	The number of videos and slides on the topic and the requirements for their recording, for example, recording in the studio, auditorium, library, traveling videos, etc.	Training load in accordance with the work program of the discipline
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Planning a pedagogical scenario involves the author's clear vision of the educational space of the online course, the ability to identify pedagogical technologies in accordance with the characteristics of the target audience of the course, a thorough design of the content of educational activities. Traditional forms and means of current, intermediate and final control are excluded: oral response, written work, work in the classroom. Also, to master the text, you need a base of test tasks and practical tasks, such as self-control, tests for competence.

The course should be built on the basis of weekly planning, sections should be built on the principle of the location of the materials studied for one (or several) weeks. When implementing measures to identify the student and assess the level of achievement of learning outcomes, control over compliance with the conditions should be ensured. The share of valuation activities performed by identification must be at least 50% in the aggregate assessment at the exchange rate. The following methods of identification and control over compliance with the conditions are possible when conducting assessment measures:

- control of the student in a specialized territorial Center;
- continuous remote monitoring of the student and his actions.

Control over compliance with the conditions should ensure the exclusion of the following risks with a probability of at least 90%:

- transfer of the student to another person;
- listening (including references);
- viewing (including working on the internet, if not allowed by the terms of the assignment);
- the use of software (including remote control) [17].

After forming the topic of the course and the development team engaged in the creation of the course, the team develops the concept of the course, determines its goals and objectives, and also selects methods and forms of training. They also draw up a course plan, which can be as follows:

- materials for training sessions;

- tests and tasks;
- audiolectures, video lectures;
- practical elements necessary to successfully pass the course [6].

In addition, the developers are engaged in the creation of a course website, which will be used to present course materials and conduct online classes. The website also needs to be convenient and accessible to a wide audience. Once the course and website are created, the developers conduct testing to make sure the course is quality and effective.

There are many different structures of open online courses, but they all include the following components:

1. Introductory part, informative modules of the course in the form of lectures (text, video lectures, presentations), test tasks after each lecture and a final test or project for all the material passed. For example, the structure of the online course of the Kazakh electronic online education system "Stepik" includes[Figure 2]:

- Video lectures lasting 2 academic hours (90 minutes), divided into semantic blocks lasting 10-20 minutes each. The video may include presentations, pictures, animated videos, additional audio materials;
- Homework designed for 1-2 academic hours (45-90 minutes). Homework options are diverse: from solving specific tasks to writing an essay;
- Tasks for independent work, designed for 4-6 academic hours. It may include the study of basic and additional literature, answers to questions for self-examination, preparation for testing, study of materials on the Internet;
- Control and measuring materials-test questions with answer options, one or more of which are correct.

2. In the process of studying each module, students undergo intermediate testing - after each part of the module (1-2 questions for each part) and testing for the entire module, that is, after studying the materials of the entire module (10-15 questions). "Stepik" as a course includes modules, lessons and steps. All of them are presented in the figure below [12].

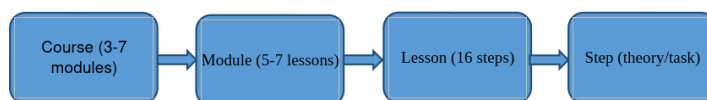


Figure 2 - Structure of courses on the "Stepik" platform



This structure must be considered when creating MOOCs. The criteria for MOOCs themselves and their meaning consist of:

1. Choosing a platform for implementing MOOCs is a strategically important step. The platform should have a user-friendly interface, provide the ability to support various types of content (visualizations, tests, practical tasks).

2. The choice of the course topic should meet modern educational and professional needs. The structure of the course content should be logically organized and systematized. It is important to give not only theoretical material, but also practical examples, cases, tasks for independent work.

3. Defining course objectives helps participants explore important aspects of the chosen topic. The expected results of the course should be measurable so that participants can assess their progress.

4. The duration of the course should be chosen in such a way that students can devote enough time to studying the material and completing tasks. This can be a short course that ends in a few weeks, or a long-term course divided into modules.

5. Conditions for completing and obtaining a certificate - it is important to set specific conditions for completing the course in order to stimulate the involvement of participants. This includes passing all tests, successfully completing practical tasks and actively participating in discussions. The certificate of completion of the course gives students a sense of accomplishment and can be used in their professional activities.

Finally, the course begins and becomes accessible to everyone. During the course, students have the opportunity to read materials, complete assignments and communicate with other course participants through an online platform. Upon completion of the course, students can receive a certificate of completion of the course.

In general, the creation of mass open online courses in Kazakhstan requires a lot of time, resources and labor. However, online courses provide new opportunities for the development and professional development of education in Kazakhstan and can become an important factor in the development of the country's educational sector. To improve the quality of the course, further development of teaching technologies and methods is required, as well as effective tools for assessing student productivity. In general, the creation of mass open online courses is an important and promising direction in education, which opens up new opportunities for students and specialists in various fields. The development of the open online course is a key factor in the development of global education and professional development of the population.

During the research work at the University, the development of an e-learning course was carried out. Once the user has gone through the registration or authorization process, they will be taken to the home page of the e-learning course, named "mentor", as shown in Figure 3. The home page contains buttons in the menu such as course information, questions, progress and result, and settings.

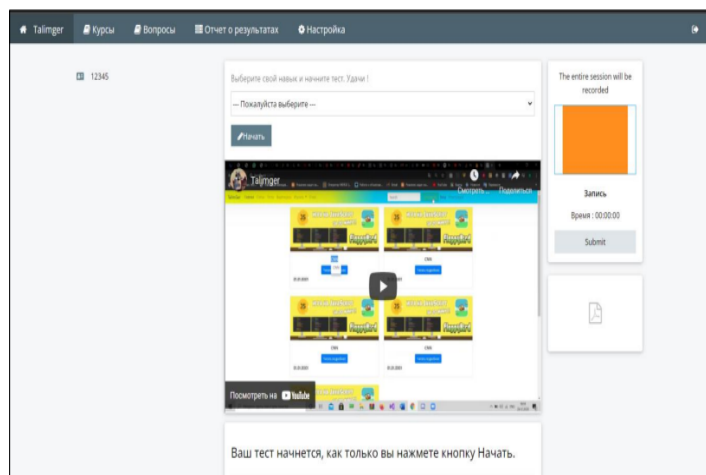
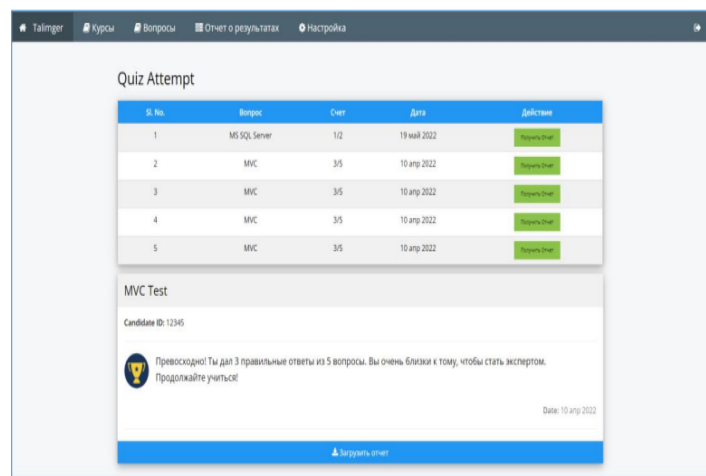


Figure 3 - Home page of the electronic course "Talimger"

In addition to the Python programming language, the platform also has courses from popular programming languages such as C# and Java. There is also a video with a special explanation on the home page of the e-learning course and the possibility of passing the test and checking the progress. When passing the test, the user must first select the course and pass the video test. The video check shows all the actions performed by the user and the time spent on testing. Well, the test result can be found by the user by clicking on the button called report results. The creation of tests that correspond to the task is a complex, multi-level process arising from many principles: compliance of the test content with

the goals of testing, determination of the importance of the knowledge being tested, the relationship of content and form, the substantive correctness of the test tasks, the representativeness of the content of the educational subject in the test content, the On the platform, the user must pass 5 mandatory questions during testing. All these questions and answers are recorded in the database, and all user responses are saved. If the student correctly finds the answers to questions above 3 questions, he will have access to the next lecture and laboratory work. Otherwise, the student will have to review the lectures again. The user can see his result as in Figure 4.



The screenshot shows a web interface for 'Quiz Attempt'. At the top, there is a navigation menu with items: 'Таймер', 'Курсы', 'Вопросы', 'Отчет о результатах', and 'Настройка'. Below the menu, the title 'Quiz Attempt' is displayed. A table lists five quiz attempts with columns for 'Sl. No.', 'Вопрос', 'Счет', 'Дата', and 'Действие'. Below the table, there is a section titled 'MVC Test' with 'Candidate ID: 12345'. A congratulatory message in Russian states: 'Поздравляем! Ты дал 3 правильные ответы из 5 вопросов. Вы очень близки к тому, чтобы стать экспертом. Продолжайте учиться!'. The date 'Date: 10 apr 2022' is shown at the bottom right. A 'Закрыть отчет' button is at the bottom center.

Sl. No.	Вопрос	Счет	Дата	Действие
1	MS SQL Server	1/2	19 май 2022	Закрыть отчет
2	MVC	3/5	10 апр 2022	Закрыть отчет
3	MVC	3/5	10 апр 2022	Закрыть отчет
4	MVC	3/5	10 апр 2022	Закрыть отчет
5	MVC	3/5	10 апр 2022	Закрыть отчет

Figure 4 - Test results

Users can access their profile by clicking the settings button in the menu. This page contains the name, phone number and email address of users. If desired, the user can add a picture.

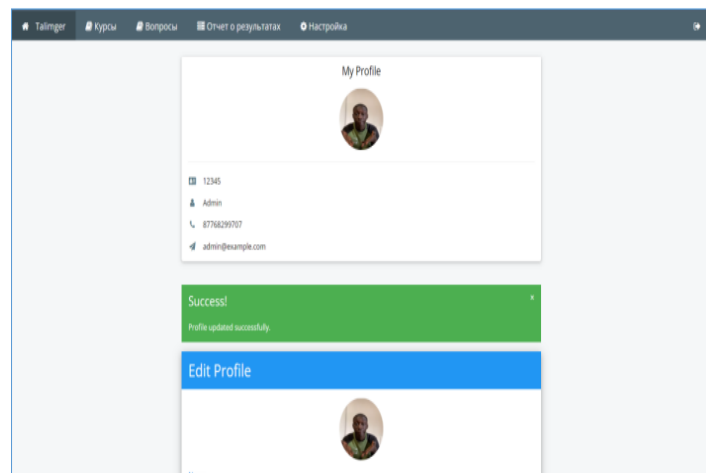


Figure 5 - User settings page



In addition, users of these sections have the ability to change them. In Figure 5 shows the settings page for these users.

Among the users, students who successfully complete the course will be issued a special certificate, as shown in Figure 6. A certificate is a document confirming the identity of its supplier, as well as the existence of any property or other rights.



Figure 6 - The certificate is issued after completing the “Python Programming Language” course

**Conclusions.** Summing up, we can say that the creation of mass open online courses is becoming an increasingly relevant and demanded direction in modern education. MOOC allows you to get high-quality education anywhere in the world, which makes them available to everyone. The creation of the open online course requires considerable effort and resources, including technical support, development of materials, and organization of the educational process. The creation of mass open online courses in Kazakhstan is also becoming more and more popular. Many educational institutions in Kazakhstan have begun to actively develop and offer online course on economics, law, Earth Sciences, Technology and other topics. As a result, our course of work showed that in connection with the large number of users to reduce production, work is carried out on optimization with the introduction of new technologies.

The study showed that in the educational process of the university there are several types of integration of the MOOC, each of which has its own advantages and limitations. The choice of the best type of integration depends on the goals of the educational institution, the needs of students and the available resources. The introduction of MOOC in the educational process of universities can contribute to flexible and effective teaching, as well as to expanding the educational

opportunities of students.

A lot of work still needs to be done for the further development of the M & A in the Kazakh language. Although some educational institutions have already begun to provide JOAC, many of them still do not have enough experience and resources to create quality courses. Thus, the study of the creation of mass open online courses, the implementation of which is relevant and important work for a number of reasons:

- first of all, there is an active growth of interest in online education in Kazakhstan. The situation with COVID-19 also intensified this trend, as many educational institutions were forced to switch to the form of distance learning. In this regard, the creation of the online course may be one way to increase access to education and improve the quality of online learning.

- secondly, Kazakhstan sets itself the goal of modernizing education and increasing its competitiveness. One of the means to achieve this goal can be the use of the course to develop the skills and knowledge of students and teachers in various fields.

- thirdly, the creation of an open online course can become a platform for the development of national content and cultural heritage. Kazakhstan has a rich history and culture that can be used to create educational content at the international level.

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In addition, there is also the problem of low awareness of a wide audience about the possibilities of the course. However, the creation of the MOOC in Kazakhstan has a great potential for the development of education in the country. Open online courses can be used to improve the quality of education, improve the skills and retraining of specialists in various fields, as well as attract international students and investors to the education sector of Kazakhstan.

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***Information about the authors***

Buribaev B.B. -Candidate of Technical Sciences, Associate Professor, Al-Farabi Kazakh National University, e-mail: b.buribaev@gmail.com;

Kalidollina G.T.- teacher, Master’s degree, Al-Farabi Kazakh National University, e-mail: kalidollina2021@gmail.com;

Barat B.T. - master student, Al-Farabi Kazakh National University, e-mail: bekzat.barat@mail.ru;

Utegen G.U. - master student, Al-Farabi Kazakh National University, e-mail: gulbarshyn.utegenova@mail.ru

***Сведения об авторах***

Бәрібаев Б.Б.-кандидат технических наук, доцент КазНУ имени аль-Фараби, e-mail: b.buribaev@gmail.com;

Қалидоллина Г.Т.- преподаватель, магистр КазНУ имени аль-Фараби, e-mail: kalidollina2021@gmail.com;

Барат Б.Т. - магистрант КазНУ имени аль-Фараби, e-mail: bekzat.barat@mail.ru;

Утеген Г.У. - магистрант КазНУ имени аль-Фараби, e-mail: gulbarshyn.utegenova@mail.ru