

## DEVELOPMENT OF A MASSIVE OPEN ONLINE COURSE WITH ELEMENTS OF GAMIFICATION

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### ABSTRACT

Currently, Mass Open Online Courses in online learning are developing rapidly. Many mistakes are taken into account, and day by day their usefulness is growing. Nevertheless, it is necessary that even the correct development of the course consists of several steps.

The development of a massive open online course with elements of gamification is the use of game elements in the process of learning the content of this discipline. It should not be confused with the game: gamification is primarily a method aimed at achieving results. The questions considered during the development of a mass open online course with elements of gamification for use in online learning are as follows: course description, scoring system, rating, creation of Avatars and roles, Content, Classification of modules, their division into classes, filling in the framework of theory and practice, the final part, that is, the passage of the exam depending on the past module, the availability of feedback and the development of the certificate, which were compiled in comparison with foreign courses and found answers. When developing the course, it was directly related to the problems of deepening knowledge, learning to work for students. In particular, with the help of the course developed on the Stepik online educational platform, "Python" allows you to learn the basics of programming with the help of game elements, achieve such goals as increasing interest in it, solve key problems and form a positive attitude about the course. If in the traditional education system each lesson is held in an offline format, today the importance of mass open online courses in distance learning is growing day by day. In addition, in the learning process, in general, the developed mass open online courses allow you to qualitatively train specialists who are in demand in the modern information society and whose application in all programming languages or any field meets the requirements of knowledge.

**Keywords.** Learning technology, gamification, mass open online course, online learning, game elements.

### INTRODUCTION

Today, under the influence of various epidemics, a special place is occupied by the method of training – the online learning system. This is due to the increase in online courses and, with it, the increase in the quality of education, in addition to saving time.

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In this regard, there is a need for the formation of professional competencies among students in the context of information transfer of knowledge based on the conducted research work and the creation of pedagogical methodological mass open online training courses, and the development of any courses with elements of gamification from the usual educational system. Analysis of the current state of the scientific-pedagogical and educational-methodical manual on the issue of developing a mass open online course with elements of gamification in the field of computer science, consideration of teaching methods, identification of features, conducting training with the help of game elements, drawing up a course in the Kazakh language determine the relevance of the research topic.

Purpose of the study. To see the effectiveness of the development of a massive open online course with elements of gamification for use in teaching.

Research objectives:

- analysis of the experience of domestic and foreign scientists of the application of online learning technology in the education system;
- to identify the features of a massive open online course with elements of gamification for use in teaching;
- development of a massive open online course "Python" with elements of gamification in the Kazakh language for use in teaching and proving its effectiveness by experimental and experimental means.

Research methods. Analysis of scientific and methodological literature, teaching methods, accumulation, generalization of data, familiarization with the content of the program "Python" related to the informatization of Education, study, practical application and observation of the features of best practices, conducting experimental experiments.

History. Currently, mass open online courses are becoming more and more popular. The first such course appeared in 2008, they were based on the theory of connectivism proposed by George Siemens and Stephen Downs. In a short time, this type of course is gaining great popularity. 2011 was called the year of "mass Open Distance Learning".

The goal of opening open online courses is to unite students and teachers living in different countries of the world. The abbreviation MOOC consists of four separate terms:

- \* massive (massive): this type of online learning involves a large number of students who are not limited by their geographical location;
- \* open (open): online training is free for everyone;
- \* online (online): distance learning courses are conducted using online communication tools. All materials are freely available in electronic form;
- \* course: the presentation of information in a structured and orderly way with specific objectives, work rules and time limits, although it may vary for each individual participant.

Research results. The network has a huge number of definitions of a massive open online course. A mass open online course (IOC) is an online course, the peculiarity of which is open access to educational and control and measurement materials of the course in a volume sufficient for students to achieve the planned learning outcomes and evaluate them [1].

Mass open online course-a training course with mass interactive participation using e-learning technologies and open access via the internet, is one of the forms of distance education. It is aimed at a wide audience, it is free, and anyone can start the course. In our opinion, it is necessary to distinguish between the concepts of a massive open online course and simply online courses, since these two concepts mean different meanings. Massive open online courses are offered by many training platform. They allow you to get experience, knowledge and ideas from various experts, as well as take training courses in foreign universities from the country's leading universities, anywhere in the world. A massive open online course is created on different topics and in different areas. The platforms offer hundreds of courses to study in different subjects. The most popular sites where you can find a rich catalog of massively open online courses in many subjects: Lectorium, Coursera, Universarium, Stepic, Edx and others. Massive open online courses are a set of chapters united by one common topic. Course developers strive to make the course as clear and interesting as possible. Online courses can include animations, cartoons, links to additional sources, create general chats for discussion, introduce gamification, and much more. Interesting chips, effects, a good speaker (known or simply a good speaker) is able to attract as many students as possible and increase the number of people who have completed the course to the end. After all, now statistics show that by the end of a massive open online course, about 7-10% of the total number of those who signed up for the course at the very beginning pass. If the student passes all the chapters, then he fully assimilates the material. Because the course is designed to "piece" the simplest and most complex information. Each chapter can be provided with questions to consolidate the studied material, and also, at the end of the entire course, the student must pass the final Test or complete the final task. After completing the course, a certificate can be issued. In the future, it can be used to obtain test units at the university or attach to the portfolio. Also, the student may not listen to the entire course, but read a chapter or section that is necessary or necessary for the trainee. In addition, teachers can resort to a massive open online course and read a specific chapter as a task, or show an image of an online course in the learning process. A massive open online course can be called not only one of the formats of training, but also a tool that the teacher can use in his work.

Passing online courses can act as material for working in groups and teams, not only as a mandatory task for learning, but also as one of the ways to work with gifted children. For them, online courses will be a source of knowledge for further education, as well as an opportunity to delve deeper into the subject. In addition, the online course helps lagging students to understand the missing topic or undeveloped material in a concise and understandable way, and then consolidate not only the tasks in the textbook, but also the tasks after completing a chapter or section on the site by a massive open online course.

Therefore, online courses can become part of the educational process and one of the formats of student self-education. The emergence and widespread use of a massive open online course helps to gain new knowledge and introduce blended learning into educational institutions. It should also be noted that online courses can be part or complement of all stages of learning from preschool

age, and even be the main source of new knowledge and skills for continuing and postgraduate education for adults.

As the pandemic has shown, massive open online courses are an opportunity to learn directly from home, which is considered convenient and accessible to anyone who has a computer connected to the internet. The number of users of online courses has increased several times. Perhaps the teachers themselves realized that online education opens up new opportunities and the need for it, they have been thinking about introducing online courses into professional activities along with full-time training.

Despite the fact that the study of courses provides great opportunities, it is also necessary to take into account their disadvantages: the inability to ask a question during a lecture, not always correct and reliable information, sometimes simply irrelevant, may not contain the necessary and useful information for the course. A team or author who has developed a massive open online course will try to anticipate and fully realize all expectations for the course, but sometimes this may not be fully realized. Therefore, the teacher should carefully select online courses that are massively open to students. And students who independently enroll in a massive open online course are advised not to be afraid to leave honest feedback to developers and, if there is a lot of interest and desire, then conduct online courses to the end. Thus, from the above, we can conclude that mass open online courses are not only one of the formats of training, but also an incredibly effective tool that provides ample opportunities for effective learning and self-education. They will allow you to learn something new or learn and understand some problem more deeply. Massive open online courses are becoming more accessible and freer, allowing you to train and develop people who do not have the financial means to invest a lot of money in education. The introduction of a massive open online course into the training system at all stages is gaining momentum. Also, the active introduction of blended learning allowed mass online courses to take their place in the education system.

The relevance of using a massive open online course in the advanced training system is emphasized by many researchers:

\* O. M. Gushchina, O. P. Mikheeva described the model of professional development of pedagogical personnel with the help of mass Open Online Courses [2];

\* N. V. Nikulicheva emphasized the high efficiency of a massive open online course with a reverse consulting connection with the teacher [3];

Volobueva T. O. Sundukova, G. V. Vanykina conducted an analysis of models for the introduction of a mass open online course into the corporate training system [4, 5];

\* N. N. Trofimova talks about the possibility of using a massive open online course to improve the skills of enterprise workers in the current unstable external environment (for example, currently associated with the COVID-19 pandemic) [6].

The need and effectiveness of the use of a mass open online course in the system of advanced training, including the beginning of information education, is associated with the formation of educational needs and a high level of self-regulation of specialists who have received professional education.

Speaking about the thematic areas of the mass open online course, it should be noted that the early emergence and, accordingly, the widespread use of the mass open online course on information technology was historically predetermined. Later, the massive open online course spread to other subjects in the natural sciences, and then to the humanities cycle. Currently, massive open online course-platforms are replete with courses on a wide variety of topics in many subject areas for different age categories of listeners. As for online courses in the humanities, we can see their widespread use for teaching students a foreign language through the research of the following authors: (N. V. Vaganova, O. A. Demina, V. L. Lunina, O. V. Telegina, V. V. Borshcheva, E. V. Ganyushkina, M. V. Zolotova. To a lesser extent, the experience of using a massive open online course for other humanitarian disciplines is described: the subject of history (A. V. Bukhantsova, E. S. Stetskevich), Russian and foreign languages (E. G. Azimov, D. A. Khaldeeva, V. D. Gorbenko, T. N. Dominova).

If the introduction of the procedure for reviewing mass open online courses in the educational process of universities is a positive aspect, the following can be noted:

1. each teacher, organizing the educational process, can use individual materials to select or provide mass online courses, which will allow students to complete the training course.
2. it is possible to use various forms and technologies in the educational process, that is, in continuous and mixed training, not only in higher educational institutions.
3. the main advantage of the massive open online course is that it can be used by students in case of need for independent work.
4. Mass Open Online Courses apply to advanced training.
5. conducting online courses offered by the public can be used as an open online course in English in such a way as to provide an additional opportunity for the teacher and student to develop their linguistic competence.
6. the use of mass open online courses allows you to listen to the best teachers of the world, learn without interruption, reduces the need for educational migration.

Thus, using mass open online courses, the university performs the functions of providing information to any person, regardless of its location, age, health, which significantly implements the function of additional and continuing education.



**Figure 1: Growth Rate of Game Training Around The World, 2019-2024**

In addition, if we pay attention to the small statistics identified in the following surveys conducted at this conference [12]:

- 1.33% of employees prefer the presence of game elements on training platforms.
- 2.83% of employees who have received gamified training are more motivated to work.
- 3.61% of employees undergo gamified training.
- 4.49% of employees get tired of non-gamified training.
5. consolidation of knowledge increases by 30% if the oral and/or text presentation is accompanied by images, infographics and other types of visual aids.
6. 12% of employees engaged in non-medical training work without results, which is higher than in gamified training (3%).
7. according to a study by the University of Colorado "on the impact of modeling and games for adults", gamified learning methods increase skills-based knowledge by 14%, specific knowledge by 11%, and memory by 9% compared to traditional learning methods.

Gamification in education partially coincides with gamification in employee training. However, if employees are still obliged to undergo training and understand this well, and the management keeps them under control, and even pays them all the time of work, including for training, then students of schools and universities are not. If a child is bored with studying, then his tendency to study decreases, he treats classes superficially and his desire to learn decreases. In general, no one will be worse than this, except for one child. No one will follow the child closely, and the need to increase his interest, help the child learn better and show more interest in learning with this method will be even greater.

Now, when almost all education has gone online to some extent, even bigger problems have arisen. If the classic forms of lectures and knowledge tests are simply transferred to the internet, then they will not be much more effective. At the same time, it is not easy to reform them, teachers do not have enough personal funds to reorganize educational courses. This is where the gamification of the training platform can help, in which we do not recreate the exercises and each topic, but also gamification of the educational platform or school in general. By doing this, we increase the interest of the student, perhaps it is clear that he can make topics that are still uninteresting a little more interesting.

One of the facts noted at the "Metaari 2019" conference is the survey of students on gamification [11, p. 2]. According to this survey, 67% of students spoke about the benefits of gamification and its positive impact on the educational process.

Statistics of inquiries and surveys on the impact of gamification on the learning system [13, 14, 15]:

1. gamification in Test - based education increased student performance by 34.75%.
2. in addition, students who received education through test-based gamification increased their performance by 89.45% compared to those who received only lectures.
3. 67% of students find gamified learning more stimulating and interesting than traditional classes.

4. gamification is one of the 10 most important functions of the learning management system.

As noted above, education takes place online, and this is the main principle of great growth, the complete transformation of most of the educational materials and the educational process on the internet. This is always the case, IT solutions are a little delayed, although education is taking place online, platforms and solutions are now the time to start their evolution. The main changes, including the gamification of education, are still ahead, and we will still see its peak in the next few years. According to the forecast for the 2019-2024 period developed by Metaari, the following are expected to be met [89]:

- \* according to forecasts, teaching children through games will be one of the leading sources of income for developers from 2019 to 2024, an increase of 21.4;

- \* according to forecasts, income from educational games for young children will triple by 2024;

- \* the use of technology in schools around the world will continue to grow. Currently, 55% of students use smartphones in classrooms, 64% use smartphones for homework, and 65% use laptops for homework;

- in addition, due to the COVID-19 pandemic, according to information from the United States Census Bureau, 93% of families with children in the country are engaged remotely by students living with them, which means the need for EdTech, such as LMS and gamification;

- \* virtual reality-based educational games have the highest growth rate among all types of educational games until 2024-51.9%, followed by assessment and analysis games - 46.2% and language learning games-41.8;

- \* training based on Higher Education games will increase by 15.4% and from year 2019 to 2024;

- \* Learning and game-based education will exceed доллардан 24 million by 2024;

- According to a survey conducted by Boston Retail Partners, nine out of ten sellers (87%) use gamification methods over the next five years. Almost half (46%) of them showed that the loyalty program, which includes these elements, is one of their main priorities.

As we can see, the gamification market, the number of implementations and gamification are a growing variety of industries every year. Even in Russia began to be used with gamification for about 10 years, and in the West it became popular 5-10 years before it. Gamification has not only found its place and appeared in most modern innovative products, but thanks to the accumulated experience, it can be used to solve almost any problem, which is associated with the management of user participation and its attention.

As with many modern product practices, the effectiveness of gamification can be easily counted in numbers, you can see its impact on revenue and user activity. However, gamification cannot be called a universal solution to any problem, since it is very difficult to make the right solution, and template solutions that are copied from one company to another, from one industry to another work much worse.

In particular, it seems, because in the gamification market there are not so many universal aggregators and universal platforms that carry out gamification everywhere for any client. There are leaders in many other areas: social media, online stores, CRM. In the case of gamification, each product needs its own gamification, which is done through trial and error for each product.

Once again, we note that mass open online courses do not aim to replace traditional education, the goal is to make knowledge more accessible. Everything else largely depends on the student himself, the teacher, us — those who want to use mass open online courses as part of self-education. It is up to us to be able to work independently, competently plan our time, have a desire to study online, know the purpose of our own studies and the result we want to achieve. All this allows us to constantly realize ourselves and fit into the rapidly changing world.

## **DISCUSSION.**

After analyzing the mass Open Online Courses on Python, we found that there are several types of courses on Python in the world. Speaking about each separately [24]:

1. Python for Data Science, AI & Development (Coursera).

2. Skillbox online platform "Profiya Python-developer". In Python, they write web applications and neural networks, perform scientific calculations, and automate processes. Learning the language will be easy, even if the course recipient has never programmed it.

3. Geekbrains online platform "faculty Python-development". Webinars are held in Zoom: the teacher is asked questions, answers are received, and there is an opportunity to communicate with classmates. Even if you have to skip every webinar, you can easily browse in the post.

4. "Python-developer with zero" Netology. Python (according to Stack Overflow) is among the 10 most popular programming languages. It opens the way to the best IT companies: Google, Pixar, Youtube, Instagram, NASA, Intel, Pinterest often use it.

5. "Profi Fullstack-developer on Python" by SkillFactory. According to the organizers of the course: "our courses are aimed at dedicating the necessary time to study according to your schedule, so that training is as effective as possible, we are changing training formats: simulators, tests, IDEO lessons, online mitaps, hackathons and projects. Course programs are developed by experts with experience of 5 years. Students are helped by experienced mentors in the IT industry: they give full feedback, answer questions. All students, regardless of age and previous experience, will be able to cope with the course for beginners — the main thing is to follow the curriculum.

6. «Python. Advanced course" Luxoft Training online platform. The course analyzes all aspects of the object-oriented approach to Python.

7. "Python for analysis of data" Coursera online platform and Mail.Ru course offered by Group Corporation.

However, all these courses are written in Russian, English and other languages. Therefore, we have compiled a massive open online course on the Python programming language in the Kazakh language.

No№	Python course modules	Name of classes	Limit score
11	Data I / O	1. Introduction. Getting to know Python 2. print and input commands 3. Sep and end commands 4.integer arithmetic. The first part 5. integer arithmetic. The second part	no entry limit
22	Conditional operator	1. choosing two to one 2. logical operations 3. embedded and cascading conditions	15 score
33	Data types	1. digital data types: int, float 2. math module 3. string data type	66 score
44	For and while cycles	1. For loop 2. for loop: range function 3. frequent scenarios 4. while cycle 5. while loop: processing numbers 6. break, continue and else 7. error search and code revision 8.internal loops. Part 1, 2	52 score
55	Data string type	1. indexing 2. cuttings 3. Ways methods. Part 1 4.Ways methods. Part 2 5.Ways methods. Part 3 6. tracks in computer memory	141 score
66	Lists	1. Introduction to lists 2. basics of working with lists 3. methods of lists Part 1 4. extracting list items 5. split, join list methods 6. methods of lists Part 2 7. list expressions 8. sorting lists	120 score
77	Functions	1. parameterless functions 2. parametric functions 3. local and global variables 4. return value functions.Section 1,2,3	72 score

The modules of our Python online course and the number of threshold points required to open each module were shown in the lesson schedule. Another feature of our course is that in order to move from one module to another, you need to set a certain score limit. To collect these points, each student must complete tasks inside the lesson:

In the scoring system, you can score from 1 to 20 points for each task. Among them, each:

- \* Theoretical questions-1 point. These include: test, text, fill-in, and identification reports.
- \* Programming problems-5-20 points. It includes programming reports that are given on past topics.

The course also introduces the first elements of gamification: based on the scoring system, there will be a rating of all passers-by and an individual role for everyone. The rating will show the Avatar, roles and scores of each student.

As a key element of gamification: there is a reason why avatars and roles are chosen. Avatars are selected according to our recommendation. And the roles are given depending on The Points Earned. Thanks to these elements, the interest of passers-by in the educational process increases due to the competition and competition of passers-by with each other.

The steps that are encountered during the course of classes: the first step is always the theoretical part on the topic, followed by theoretical questions and practical tasks. It stands at the top of the steps - stem page.

The practical steps will include programming tasks. Programming tasks, along with Python, can be created in more than 30 other programming languages.

Programming tasks are divided into three categories:

- \* basic-5 points;
- \* a high level of complexity is marked with an angle and is rated at 10 points;
- \* the highest level of complexity is marked with two angles and is estimated at 20 points.

After three attempts to solve the highest and highest level of complexity, access to the forum will open, where those who solved it will discuss the problem. For each such task, there will be exemplary solutions approved by the author of the course.

Also, when completing each module, there are final, that is, control sections for the transition to the next module. It will last 240 minutes in the control department, and inside will be theoretical and practical questions on the past module.

In addition, our course has a window to leave feedback and comments. Its purpose is to create communication between the organizers and passers-by in the developed course, to answer questions about the course and questions that arise on programming problems.

At the very end, of course, Python course passers-by will receive awards and certificates. Special certificates are developed for all course finishers. The certificate contains the name of the course finisher, the date of graduation.

Certificates are issued in electronic form (with a permanent link to PDF). The link to the certificate is in the "My Courses" section (you need to find the course in the list, click in the upper right corner of the lower indicator and click on the inscription "Certificate" in the menu that opens). Everyone can share their certificate on social networks. It is worth recalling that the certificate indicates the name that is in the profile of the course passer, so it is necessary to check in advance (before the certificate is issued) that the correct information is there. They can be changed in the profile settings or by reference. As a rule, all certificates are issued in the profile and are visible to other users of the platform.

This is a developed Python online course – designed for use in blended learning. The advantage over other courses is the presence of game elements in it, or rather:

- \* scoring system;
- \* rating of course passers-by;
- \* personal avatars;
- \* roles;
- \* addition of game elements to some tasks.

A massive open online course "Python" with elements of gamification for use in mixed learning was offered to students of Grade 9 "A" of Secondary School No. 167, Almaty district, Almaty. The duration of the Python online course was 1.5 months. 10 students took part in the test. As a result of the developed course, 8 students – 80% received a high score of more than 1200 points and achieved course certificates. Students who took the course developed by us evaluated the course, compared it with the process of learning the Python programming language in Computer Science at school, and expressed their satisfaction. Can also be used as a guide for teachers.

#### Conclusion.

However, the advantages noted by schoolchildren who took the massive open online course "Python" with elements of gamification are:

1. rating system.
2. roles.
3. availability of a programming problem validation environment.
4. speed of passing test tasks.
5. rewind and revise the theory of the subject at any time.
6. ability to create reports together with classmates through the comment window.
7. the test can be re-marked if there is an error during the passage of the test, so that you can easily understand the topic covered.

Also, in the course of the test, the students' ability to do "teamwork" increased. In our opinion, there are many benefits from having only one thought, any process created by combining several thoughts. Courses with elements of gamification, which motivate students to become more versatile in the field of education, are an opportunity to learn a new way of learning and, most importantly, increase their motivation.

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