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**EFFECTIVE LEARNING IN THE DIGITAL EDUCATION SPACE
(ON THE EXAMPLE OF SPbPU)**

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Abstract

In this article describes the experience of SPbPU in building an effective educational trajectory in the conditions of general digitalization. The authors share their experience in the implementation of massive open online courses in the traditional educational process. The Polytechnic University has been developing massive open online courses for years. Today the University has more than 50 courses. More than 250,000 external students have already been involved in the courses. The University is actively working not only to create such courses, but also to introduce them into the educational process. Various formats of online courses implementation have been developed and the necessary local regulatory and methodological base has been created. Various reference materials have been developed to help develop, master and incorporate online courses into the learning process (<http://open.spbstu.ru/edu-onlain-help/>). Online courses are used in all educational programs implemented at the University. The model of implementation of the mixed learning format and the problems arising at each stage are considered step by step. A somewhat unexpected problem was the lack of readiness of students to use online courses in the educational process, partly caused by the lack of self-discipline. The necessity of maximum coordination of interaction between teachers implementing different sections of the discipline is emphasized. We have a brief description of the main stages of online courses implementation, the difficulties of each practice are described. The motivation of students for different practices is studied

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1. Introduction

It has been a commonly accepted opinion that the online component must play a role in the educational process. The analysis of international trends shows that leading universities increasingly more often find it difficult “for universities to compete with massive open online courses, or MOOCs,” [1, 2] and that blended learning can become (and is currently in the process of becoming) the future of higher education (Bolotin & Bakayev, 2018b).

The most popular model of blended learning implemented in the West is the model of the adjustable education space with application of online resources for senior courses. One such example is the Imperial College London, which offers a Master’s degree in engineering with online courses in business in the students’ last semester of studies (Adams Becker, Cummins, Davis, Freeman, Hall Giesinger, & Ananthanarayanan, 2017; Bakayev, Vasilyeva, Kalmykova, & Razinkina, 2018; Bakayev & Bolotin, 2017; Ednie & Stibor, 2017). Another interesting practice can be seen at the Higher School of Economics in Russia. This university offers a selection of minors – additional educational trajectories within the Bachelor’s curriculum (Kalmykova, Pustyl'nik, & Razinkina, 2017; Pityn, Briskin, Perederiy, Galan, Tsyhykalo, & Popova, 2017; Toni Mohr, Holtbrugge & Berg, 2012).

2. Problem Statement

To consider the most popular practices of introducing online resources in the curriculum of our university, which enable to speak that required and online courses format dictate different approaches to implementation of the blended learning model, to determining motivating factors of learning as well as the requirements to the volume and content of materials delivery methods.

3. Research Questions

The challenges of today include uncertainty as to the trends of development of the education sector; improved access to higher education, as most high school graduates seek to get a bachelor’s degree, and the requirements of customization of educational programs with the obligatory development of independent learning and development competencies.

In these conditions, online resources become an inalienable part of the educational process, which is also irreplaceable and in much demand. However, introducing these technologies into the learning process represent a multifaceted problem.

4. Purpose of the Study

What do we wish to achieve by transforming the educational process? We believe that introducing online resources allows to:

- help shape the student as a successful actor, whose educational needs and expectations are satisfied;
- disclose successful practices inside and outside of the university, develop them and apply them in the educational process;

- focus more closely on deeper theoretical knowledge, freeing up additional time for practice and development of soft skills;
- develop cooperation ties, rendering a positive influence of the scale of education projects and their global outreach;
- provide equal access to instructional materials of leading universities to various population groups;
- shape “professions of the future” skills now by creating individual education trajectories;
- develop critical thinking skills;
- teach new generations of students to orient themselves better in the new conditions of using digital technologies;
- provide learning opportunities that take less time, can be administered at any location and at a fraction of the price;
- reach out to new educational markets;
- implement a new educational model, which is more flexible and more quickly adaptable to new technological challenges;
- facilitate development of key factors contributing to success of the university as a learning institution;
- stimulate learners to study and gain new knowledge;
- help university faculty to achieve a new level of creativity;
- improve teaching aids accompanying the educational process;
- make the instructional environment of the university more conducive to new teaching methods (new flexible approaches);
- involve artificial intelligence tools into the educational process;
- implement continuous education opportunities, and life-long learning options for various population groups;
- encourage learning not only among students, but faculty members and corporate employees as well.

5. Research Methods

St. Petersburg Polytechnic University named after Peter the Great (SPbPU) has been actively involved in creating MOOCs (massive open online courses) since mid-2015.

Today St. Petersburg Polytechnic University offers more than 50 MOOCs available at external educational platforms, and more than 500 resources available to university students. The ways in which these resources are incorporated into the educational process and the degree of their involvement would be different depending on the concrete course. Those or other models are not always successful but this only stimulates and encourages the search for new problem solutions.

The requirements to the structure and components of MOOCs, the composition of course components have been defined in the Rules of Organizing and Using E-Learning and Distance Learning Technologies in Higher Education Curriculum (Kirk, 2013; Nikiforova, Bylieva, Lobatyuk, & Petrova, 2017; Bolotin & Bakayev, 2018a; Harvey, Kirk, & O'Donovan, 2014). The documents of the local database

of normative and methodological materials of SPbPU that are referenced in the article, can be found on the Open Polytech portal at <http://open.spbstu.ru>.

Let us consider some of the practices being implemented at SPbPU.

5.1. Massive open online courses in the learning process. Required MOOCs for students (introduced as required coursework within the program curriculum).

Today our University offers only blended learning models so the task before us is to find the most optimal correlation between the face-to-face and distance learning components without sacrificing the quality of the educational process (Figure 01).

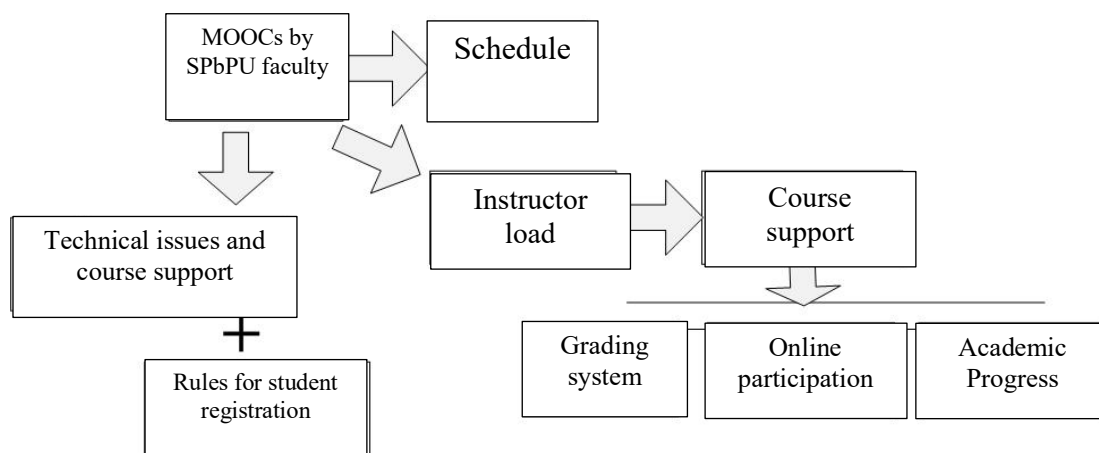


Figure 01. MOOC in the Educational Process at SPbPU

5.1.1. 1st stage of implementation

February 2016. First five MOOCs are developed at the University: Mathematical Logic, Production Management, Philosophy, Designing Buildings and Constructions. BIM, Modern Industrial Electronics.

The courses were placed on the Open Education National Platform at <https://openedu.ru/> in September 2015, and semester-long projects were completed using these materials. It must be noted that in accordance with the requirements for the courses developed for the OENP, every course corresponded to the requirements of federal state educational standards, and the outcomes met the requirements for major programs being implemented at the University. Those who completed the course received a certificate or an electronic grade transcript (for external organizations).

All the courses were developed by teams of authors at SPbPU, and before 2016 all these courses had been offered only in the face-to-face format.

The introduction of the blended learning model started with the questionnaire for the divisions, in which the interested parties (developers and consumers) indicated which course they wanted to implement in the MOOC format and how many hours each of the courses would take. It was also required to indicate the type of classes being replaced with online learning, and to establish the grading system.

The experiment was held at three institutes of the University. It must be noted here that despite the open option right, none of the respondents, including even those who designed technical courses for the

humanities, opted for a 100% online course. The model that was implemented presupposed that lectures would be held in the MOOC format, and practical seminars – as face-to-face lessons.

5.1.2. 2nd stage of implementation

September 2016 (fall semester of 2016/2017 academic year). As the semester started, five subjects offered in the MOOC format were listed as required coursework. This got reflected in the schedule (no classroom time was assigned) and the teaching load of instructors was recalculated as well.

The teaching load of online instruction was calculated in accordance with approved Norms of teaching load calculations for the SPbPU faculty.

The learning process remained in the mixed format. Course instructors were actively involved in forum discussions and answered all the questions the learners had.

Below is the list of problems that can be clearly formulated after the second stage:

- Students, especially junior students, were unprepared and unable to treat the online material as something that needed to be studied, required self-discipline and the ability to meet fairly tight deadlines;

- Some work with the students was necessary, and an introductory lecture was required for the faculty to explain MOOC learning rules to the learners;

- Lack of coordination between online lecturers and practical teachers who held face-to-face classes. This problem showed that it was necessary to prepare methodological materials for instructors, such as lesson plans for seminars and practical sessions based on online lecture materials;

- Overdue work and incompletes. Although the academic performance was monitored monthly, and assigned homework was automatically graded, and messages and reminders were regularly sent, some people still missed their deadlines and did not make up the work. To minimize this problem, the rules for submitting corrected and late work must be established at the very early stage of the course, preferably at an introductory lecture.

We not only monitored student performance but also assessed the activity of instructors online. The instructors were notified of the results of this monitoring process.

5.1.3. 3rd stage of implementation

February 2017 (spring semester of 2016/2017 academic year). We encountered a number of problems at this stage. They had to do with the fact that MOOCs were introduced at once across all the institutes of the University. Moreover, new MOOCs were added, among them, a course in the Theory of Physical Education. This was the required discipline worth 2 credit points (72 hours) for all majors.

At this stage we had first encountered the obvious demotivation problem: it had to do not with the presentation of the materials, or the quality of the course but with the learners' expressed position: "I do not think I need this course."

Indeed, when this course ("Theory of Physical Education") was offered face-to-face, large rooms were required, far from every enrolled student showed up for the lecture, and final testing was in many cases purely nominal.

As a result, the instructors passed all the students, and the students did not have to do much to get the grade.

The MOOC course allowed the students to study, comprehend and learn a certain amount of materials, classroom space was freed up, and the faculty had freer schedules.

The first edition of the course showed that 30% of the students did not finish the course; moreover, these 30% did not even register for the course. Thanks to information events, explanations provided by the faculty and introductory lectures this problem was overcome and now we have practically no students who have overdue coursework in this subject area.

5.2. Massive open online courses in the learning process. Electives

This model has been picked up by only a few teachers. They are ready to accept the learning material of other instructors, are ready to expand the educational space of learners, and are not afraid of courses being compared.

One of the examples is a technical course:

This course is offered pass/fail. At the beginning of the semester the instructor informs the students about the grading scale and the number of points they need to pass the course with no problems (or else face incompletes and further work on the course). The instructor also gave the students an option of getting more points by studying online resources on various educational platforms. After completing the course, the students received their certificate. A maximum of three courses could be taken, the points per course were calculated as 1/10 of the total number of points for the course, and included writing a comparative essay on the courses.

6. Findings

These practices not only allow the students to compare presentation of the materials across different universities and various academic schools; this approach gives them a chance to create their own unique learning route and be responsible for their selection because studying of online resources was not required.

7. Conclusion

Upon examining the experience of this project we conclude that various models of involving MOOC courses in the educational process must be accompanied by various forms of motivation and control. If these resources should be required, the control must be, in a number of cases, even stricter than in the traditional format of instruction.

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