

## Flipped Learning for Preservice Teachers in Distance Education: First Results

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### Abstract

*The article describes an experimental work on training preservice teachers using the flipped learning model in distance education. The study defines the content and essential characteristics of the flipped learning model, highlights the experience of implementing this model in professional training, and describes the possibility and features of using flipped learning to train preservice teachers. The experimental work presented in the article was carried out during one term with full-time students. In the course of the work, a learning and teaching support kit has been developed that contains the necessary guidance materials, which is the main means of implementing the flipped learning model in practice. During this work, indicators were noted that show the students' performance, students' activity during classes, and the need for extra guidance. We also compared the results of students' training using the flipped learning model with the traditional one. The conducted research confirms the great potential of the flipped learning model for teacher training, identifies its advantages, and estimates its efficiency.*

**Key-words:** Flipped Learning, Distance Learning, Teachers, Students, Efficiency.

### 1. Introduction

During the period of forced distance learning, professional training faced a number of problems, including:

- insufficient maturity of teaching, learning, guidance materials, which made students study independently;

- lack of face-to-face communication, technically complex and inconvenient communication among all participants of the learning process: students, teachers, management representatives, parents;
- a shortage of effective teaching methods in distance learning, which caused confusion among teachers and made them transform teaching programs, methods, choose new tools for distance communication (Murphy, 2020; Blinov, 2020).

All this clearly indicates a large-scale transformation of the education system. Professional training of preservice teachers in such conditions was in a difficult position: the traditional system of professional training is largely outdated and it should ensure that teachers are prepared for the new reality that is just beginning to take shape. In fact, future graduates are those teachers who will become the representatives of the professional community and they will be the first to try out the new teaching reality and will apply new technologies in the school of the future. Teacher training is forced to apply new approaches and methods of professional training quickly and effectively. This is the main contradiction of the current situation: the contradiction between outdated approaches and methods of teacher training and the realities of the educational process (especially during distance learning).

It should be noted that the need for the transformation of teaching methods and technologies appeared long before the global self-isolation and total distance learning. The conditions for changing teaching approaches and technologies can be traced back to the time of active introduction of information technologies in learning activities, which began first in the era of information system development in education and are currently developing as part of its digitalization (Khachaturova, 2017). As a result of this process, all the basic requirements for modern professional education are implemented - the requirements of personalization, flexibility, variability, technology and practical orientation, and accessibility. In teaching practice, this is reflected in the development of electronic information environments, the development of individualized programs, spread of public courses and the idea of "learning through life", etc. (Tukenova, 2019; Samerkhanova, Balakin, 2019).

However, as the practice has shown, it is still a long way to complete an effective education without face-to-face communication between the teacher and students. This is especially true for teaching students in the field of "person-to-person" professions, since the ability to work together, cooperate and communicate plays a major role in their professional activities. Analyzing the professional standard of a teacher, it can be confirmed that the most important skills of the future profes-

sional activity are formed only during face-to-face interaction, group work and practice. These opportunities for shaping professional qualities and skills in distance learning are significantly limited (Professional standard «Teacher», 2013; Samerkhanova, 2019).

Distance learning raises a number of problems:

- how to train preservice teachers distantly so that they can work with information flow independently and form their own opinion?
- how to ensure full communication during the teaching and learning process between the teacher and students and among students?
- how to teach them to process and convey information, protect their own position, and take feedback into account?

Taking into consideration the described processes in professional teacher training, in our opinion, flipped training is the most logical form, which balances independent work of a student and a more effective school time management, group and individual work at the same time.

The purpose of the research is to describe and sum up the experience of implementing of preservice teachers' training during distance learning using flipped classroom technology, as well as to determine the effectiveness factors of using this technology in further practice.

As part of the work, the following tasks were solved:

- systematized domestic and foreign information sources that reveal the features of professional training using the flipped learning technology;
- a developed electronic course "Project activities arrangement" for students (44.03.05 Pedagogical education), using the specified technology;
- students were trained using the developed course, the results of students' academic performance and their activity were analyzed and summed up;
- the factors of effective flipped learning are identified and presented.

## **2. Literature review**

The idea of flipped learning in the academic literature was first described relatively recently in the work of American teachers D. Bergman and A. Sams (Bergmann & Sams, 2012). They proposed to turn a training session "upside down", suggesting that students should first master the theory independently, and then develop and expand it in during tutorials and group discussions.

The flipped learning model has become increasingly popular with the development of information technologies that allow teachers not to spend time on retelling information, but to focus on communication, strengthening the necessary knowledge, and developing students' critical thinking skills (Kim et al., 2014; McNally et al., 2017;). In foreign educational practice, the flipped lesson technology is considered as one of the most promising modern educational technologies (Teacher Policy Development Guide; Sharples, 2014), its application experience is described in the works (Bishop & Verleger, 2013; Roehl et al., 2013; Le Roux & Nagel, 2018). The authors note that the technology of the flipped lesson is a special case of "blended learning", i.e. a learning system that combines traditional classroom classes with wide access to various resources and services of the educational environment (Baepler, 2017; Garrison, 2008; Nagaeva, 2016; Kizilova, 2018).

The flipped learning model has found acceptance and is being actively used in the Russian education system. The experience of implementing this model in flipped learning is described in the works of N. L. Antonova, A.V. Merenkov [1], O. F. Bryksina [6], E. A. Vorobyov, A. K. Murzayeva [27], A.V. Loginova [15], M. V. Yurina, Yu.B. Lopukhova [28] and others. The authors state that the flipped learning model has a number of advantages to build the students' competences and develop professionally significant qualities efficiently (such as responsibility, initiative, awareness, etc.).

The work analysis of domestic and foreign authors leads to the conclusion that the flipped classroom is not an innovation for professional training but a logical continuation of traditional training in conditions of digitalization, in which:

- there is an access to materials and resources in the educational environment 24/7;
- distance communication and guidance are possible;
- most functions of arranging and monitoring the educational process are performed by a variety of services (for example, collecting information about academic performance, student activity, etc.):
- effective distance collaborative work, student communication is possible;
- personal direct communication, discussion, argumentation are the greatest values (Antonova, 28; Colis, 2001; Graney J.; Bulganina, 2017).

For teacher training, flipped learning gives opportunities and prospects associated with:

1. individual learning process, it means various individual opportunities –content choice, the level and pace of learning to build an individual study plan;

2. more time for information reinforcement, argumentation, group work, and free communication;

3. the ability to expand the plan, adding questions and problems that are interesting for students themselves, which will increase the significance of the studied material and increase the motivation for mastering the course.

Despite the significant potential of the flipped learning model for professional training of students, including teachers, the situation of distance learning required adjustments to its standard pattern. During distance learning, there is a limited possibility to have guidance tutorials, the discussion in the classroom is carried out online, which makes not fundamental, but significant changes in the process and conditions for implementing this technology in practice. This circumstance relates to the previously unsolved part of the problem, since the use of the flipped learning model in distance learning requires a thorough methodology study, conditions and means of professional training. Therefore, the study is relevant and has practical significance.

### **3. Research methods**

Experimental work on preservice teachers' training using the flipped learning model was conducted on the basis of Nizhny Novgorod State Pedagogical University named after K. Minin (Minin University) among students majoring in Russian and Literature, History and Social studies, History and Law, History and Religion of Russia (44.03.05 Pedagogical education). 146 first-year full-time students took the course "Project activities arrangement" and took part in the work.

The experimental work was carried out as follows. At the beginning, a learning and teaching support kit was developed that contained all the necessary guidance materials in Moodle system, designed according to the flipped learning model. The theory part of the course included guidelines to work with course materials, electronic textbooks on the subject, links to various information sources, as well as test questions. The practice part of the course included tasks for self-preparation (searching for information, taking notes, processing and summing up the information etc.) and guidelines to complete tasks based on the study. The test part of the course contained requirements for the assessment tasks, criteria for evaluating current work during the term, and criteria for final assessment.

The flipped learning process in distance learning was implemented according to the pattern:

1. preliminary self-study by students and giving answers to questions;

1. discussion of the studied material during online training sessions (ZOOM), during which both control questions and extra questions are discussed;
2. taking notes of extra information learnt during the discussion, if necessary, extra guidance from the teacher or discussing it with students in the chat/forum of the e-course;
3. presentation of practice activities by students (based on the main information provided by the teacher, and extra information obtained during discussions and independent search) to their teacher, teacher's assessment of the student's independent work and activity during the lesson.

In total, during the course students took part in five discussions. The final assessment of the course involved an individual final test and the defense of an individual project.

When starting the experimental work, we assumed that the most important factors influencing the implementation of the flipped learning model in distance learning are the level of communication skills and independent work skills among students, the ability to get a teacher's guidance, and IT skills in using communication services and technologies.

Therefore, during the experiment on training preservice teachers in flipped learning, it was important for us to monitor the following issues:

- students' performance (indicator - the number of points received by students during training and as a result of final assessment), which will give an idea of how well students work with the data on their own;
- students' need for extra guidance (indicator - the number of requests from students for guidance instructions before and after the training session), which will assess the ability of students to form an educational request and build communications in a flipped learning environment;
- students' activity during practice sessions with face-to-face communication (indicator - the time spent on reproducing the previously studied information, and the time spent on discussion, argumentation, expressing one's own attitude, adding information found by the student independently), which will allow us to judge the ability of students to carry out effective communication, go beyond the proposed training material, form their own position, and demonstrate critical thinking skills.

It should be noted that during the experimental work, the assessment of academic performance was carried out according to the point-rating system approved at Minin University, where the minimum number of points for the work in the term is 45 points, the maximum is 70 points. The final

assessment (final testing) gave students an opportunity to score from 10 to 30 points. To evaluate students' performance in the flipped learning model, the following evaluation criteria were introduced: learning the materials provided by the teacher in advance (simple feedback), and the degree of transformation (one's own opinions, reasoning, etc.), which is reflected in the criteria for evaluating student work in practical classes (table 1).

Table 1 – Evaluation criteria of a student's work

Criteria	Minimum point	Maximum point
<i>Quality criteria for the course content feedback</i>		
Complete reproduction of the studied information	2	3
Logically reproduced material	1	2
Complete and correct answers to questions	0,5	1
Subtotal	3,5	7
<i>Quality criteria for the information transformation</i>		
The degree of transformation (translation into another form, structuring, etc.)	1	2
Ability to express one's own position	1	2
Active participation in the discussion	0,5	1
Subtotal	2,5	5
Total	6	11

In the course of the experimental work, the indicators described above were monitored (academic performance, activity level, and students' need for guidance), which made it possible to draw up a general conclusion of the implementation of the flipped learning model in practice, evaluate the training results, and sum up success factors for further practice.

In addition, at the end of the experimental work, the results were compared with the results of training students who have mastered this course in the traditional mode. Due to the fact that it was impossible to make such a comparison in the conditions of quarantine, the results were compared with the ones of another group of students (138 people) in the same field of study in 2019, when clas-

ses were face-to-face using an electronic course as an extra learning resource. This comparison allowed us to form an opinion of the effectiveness level of the flipped learning model.

#### 4. Results

The first result of the experimental work was to collect and interpret data about the academic activity during flipped learning (table 2).

Table 2 – Indicators of students' progress and activity during the training process according to the inverted learning model

Tutorial number	Average point according to the material reproduction criterion	Average point according to the material transformation criterion	Number of requests for guided instructions*	The time spent on the reproduction of studied information, %**	Time spent on the discussion of the studied information, %**
1	6,1	4,1	2	71	29
2	6,3	4,2	3	67	33
3	6,2	4,4	2	60	40
4	6,8	4,8	4	52	48
5	5,9	4,7	5	54	46
Average score for the learning process	6,26	4,44	3,2	60,8	39,2

\* - \* - all questions to the teacher were taken into account, both during face-to-face communication and through other means of communication (chat, forum, messengers, e - mail, etc.)

\*\* - was defined as the proportion of time from a training session (1.5 hours)



The data presented in table 2 allows us to make the following conclusion. During flipped learning, there was an increase in the average score obtained for data transformation, accompanied by an increase in the time spent on discussion. This fact indicates that students have adapted to the proposed training mode, have become more active in discussions, have tried to improve their grade by expressing their own opinions, and have reinforced their skills.

In our opinion, the number of requests for guidance instructions is low, although it shows some increase at the end of training. It happened due to the need to finish the project, which is one of the tasks for the final assessment. In most situations, students asked questions during the training session, the teacher had to explain the controversial points and comment on some mistakes. This shows the key role of classes with face-to-face communication between the teacher and students in flipped learning.

After that, the results of the course were analyzed and compared with similar results in the previous academic year (table 3). It should be noted that this comparison is not methodologically correct, but it was not possible to form standard experimental and control groups under quarantine conditions.

Table 3 – Comparison of learning outcomes in the traditional and the flipped learning modes

	Points for final tasks	2019 (traditional learning)	2020 (flipped learning)
The average score for the finished project	10-20	17,2	19,3
The average score for the final test	10-30	26,5	27

The data presented in table 3 allow us to state that the average score for the finished project differ: students, who had classes in the flipped learning mode, got the average project grades higher by about 11 %. In our opinion, this is due to the fact that students showed more developed skills of argumentation and expressing their own opinions when defending the project during flipped learning.

Comparison of the average score of the studied groups based on the results of the final testing did not give a significant difference in the scores-it was only 2% and it is not significant. It can be stated that the compared groups showed approximately equal results.

At the end of the experimental work, students were offered a feedback form containing a question about the effectiveness of flipped learning. It turned out that this mode of studying was more effective than traditional training for 42% of students, comparable in effectiveness-for 43%, 10% indicated difficulties in learning in this mode, and 15% found it difficult to answer this question.

## **5. Discussion**

The experimental work on training preservice teachers using flipped learning allowed us to draw a number of important conclusions that are valuable for further academic practice in the context of distance learning.

First, flipped learning is identified as a decent alternative to traditional learning, since students have quite good digital skills and skills of independent work with data sources (namely, the searching for the required information and transformation). The learning process shows that students need help in interpreting, applying the acquired knowledge and expressing their own position more than in searching for the necessary information. This is especially important for future teachers, as working with information is one of the main professional competencies for them.

Second, the experimental work confirmed that the flipped learning model allows the teacher to arrange the study time more effectively during the lesson. This was reflected, in particular, in the fact that much more time was spent on reproduction of the studied information by students and its discussion, and the ratio of these activities changed by the end of training (the time spent on discussion began to exceed the time allotted for oral responses). During the professional teacher training, this plays a crucial role, since it forms their ability to think independently, maintain communication, and express their own viewpoints.

Third, the use of the flipped learning model did not lead to an increase in requests for extra guidance. Students asked most of the questions during the class and then only clarifying questions were asked. It can be claimed that students, even in distance learning and flipped learning, prefer face-to-face communication both with the teacher and with one another.

When using the flipped learning model in teacher training, the most important factors for the training effectiveness were the following:

1. providing students with the opportunity to learn extra information that not only increased interest in the topic and developed their self-guided work skills, but also to form their own position on these issues;

2. establishing state criteria for evaluating tasks of the same type (i.e., common criteria for evaluating practical tasks, projects, tests, etc.) that ensure a high degree of fairness in the assessment and reduce the psychological barriers associated with public speaking and expressing one's own opinion;

3. opportunity to get tutorial instructions according to the schedule, which reduced the tension while studying (students, realizing that they can always ask for help distantly, felt more confident).

To implement flipped learning, in our opinion, it is necessary to:

- increase the quantity and quality of guidelines;
- plan the amount of information given to the students more carefully;
- adjust the evaluating criteria, taking into account the limited communication and dislocation of study groups.

Promising areas for studying the possibilities of flipped learning in domestic education practice are the study of students' readiness for independent work in such a learning mode, further study of the impact of flipped learning on students' academic performance, and motivation of participants in the educational process when using this educational technology.

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