

# PRACTICAL TRAINING OF MATHEMATICS TEACHERS AT DRAGOMANOV UKRAINIAN STATE UNIVERSITY

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**Rezumat.** În articol este prezentată experiența privind organizarea și desfășurarea practicilor pedagogice în cadrul Universității de Stat „M. Dragomanov” din Ucraina. Sunt conturate tipurile, scopurile, sarcinile și criteriile de organizare și evaluare a practicilor în sistemul de formare profesională inițială a viitorului profesor de matematică. Sunt precizate competențele generale și profesionale ale studenților Facultății de Matematică, Informatică și Fizică, formarea cărora se realizează în cadrul practicelor.

**Cuvinte-cheie:** *practică, formarea profesorilor de matematică, competențe generale și profesionale, sarcini de practică.*

**Resume.** *In this article we consider the experience of organizing and conducting pedagogical practices at the Dragomanov Ukrainian State University at the current stage. The types, purpose, tasks and criteria for evaluating practices in the system of practical training of the future teacher of mathematics are outlined. The general and professional competences of students of the Faculty of Mathematics, Informatics and Physics, whose formation is acquired during practical tasks, are specified.*

**Keywords:** *practice, mathematics teacher training, general and professional competences, tasks of practice.*

**Introduction.** The restructuring processes in education, which have been ongoing in Ukraine for the past few years, affect all its spheres: schools, universities, management structures, pedagogical sciences, training of a new generation of teachers, particularly mathematics teachers. Due to various factors, the preparation of a competent mathematics teacher has become more difficult. We have to give up some traditional forms and methods of work, look for new ones that are more adapted to the needs of today. Theoretical and practical training play an important role in such preparation. Theoretical training is provided by the study of fundamental, professionally significant and selective disciplines, and practical training is provided by various types of industrial practices. It is on the organization, conduct and tasks of industrial practices that we want to focus in this article, in which, in thesis form, we present our experience of

conducting pedagogical practices at the Faculty of Mathematics, Informatics and Physics of Dragomanov Ukrainian State University with students of the specialty 014 Secondary Education (Mathematics).

Since the faculty trains mathematics teachers at both the bachelor's and master's levels of education, pedagogical practices are provided for by the curricula at both levels.

While studying at the bachelor's level, students undergo three industrial practices:

- propaedeutic pedagogical practice: III year, 5th semester, 4 weeks, 6 credits;
- industrial practice 1: 3rd year, 6th semester, 4 weeks, 6 credits;
- industrial practice 2: 4th year, 6th semester, duration 4 weeks, 9 credits.

On the master's degree, according to the curriculum, three industrial practices are also provided:

- industrial practice 1: 1st year, 1 semester, 4 weeks, 6 credits;
- industrial practice 2: 1st year, 2nd semester, 4 weeks, 6 credits;
- industrial practice 3: 2nd year, 3rd semester, 2 weeks, 3 credits.

In addition to industrial practice, master's students also undergo scientific research practice, which is aimed at forming their skills and abilities to conduct scientific research in the field of theory and methodology of teaching mathematics. A new approach to the organization and practical training of future teachers of mathematics prompted the staff of our department to develop and implement a new program of end-to-end practices, review and define practice bases, conclude new regulatory documents, methodological recommendations for students and managers, reporting forms, etc.

It should be noted that the practical training of students in the system higher education (we mean educational and industrial practices) is an important educational component of the professional training of future teachers of mathematics, first of all from the point of view of students acquiring and improving practical skills of educational, educational and extracurricular activities in institutions of general secondary education (for bachelors) and specialized schools and institutions of professional preliminary education (for masters). In addition, during practice, diagnosis and control of the level of formation of general and professional competencies of the students of education takes place. The mentioned competencies are formulated in the description of educational and professional programs for bachelors and masters.

**Main results.** The process of passing pedagogical practice is a complex event and involves: studying the school's educational and educational work system; studying the student body or its individual representative and drawing up a description of the student body or student; studying the educational and methodological activities of a mathematics teacher, who is a mentor for a student during the internship; educational-methodical and research work as

a mathematics teacher; extracurricular work on the subject; performing the functions of assistant class teacher; self-reflection and evaluation of the performance of colleagues; preparation of report documentation and presentation of results obtained during pedagogical practice. The specified types of student-intern activity are present both during educational (propaedeutic) and during industrial practice. However, depending on the type of practice, the amount of tasks corresponding to a specific type of activity is determined.

In accordance with the educational programs under which master' studies are carried out, the process of practical training of students should contribute to the formation and development of *general competencies*:

- social competence;
- ability to generate new ideas (creativity);
- the ability to learn and master modern knowledge;
- the ability to make informed decisions;
- information and digital competence;
- emotional and ethical competence;
- ability to identify, pose and solve problems;
- the ability to act socially responsibly and consciously;
- the ability to quickly adapt to the challenges of time, to specific conditions and the ability to learn throughout life, as well as *professional competences*:
- linguistic and communicative competence;
- subject-methodical competence;
- psychological competence;
- competence of pedagogical partnership;
- prognostic competence;
- organizational competence;
- assessment and analytical competence;
- innovative competence;
- reflective competence;
- methodological competence.

Students' acquisition of the specified general and professional competencies is the basis of their formation as teachers of the following subjects:

- carry out various types of analysis: logical-mathematical and methodical analysis of program educational material; psychological and pedagogical of the student body; self-analysis of educational and educational activities;
- predict the results of the educational process; carry out planning of educational, research and educational activities of students, in particular, using information and communication technologies for this purpose;
- determine the general goal and formulate appropriate tasks for various stages of the educational process, taking into account the age and

- individual characteristics of apprenticeship (including for children with special educational needs);
- simulate mathematics lessons of various types, taking into account the characteristics of the student body and/or the profile of the educational institution;
- carry out integrated training, select and use modern effective methods and technologies of training, education and development of students;
- use innovative and information and communication technologies in a didactically justified manner during lessons, extracurricular work on the subject or educational activities;
- carry out assessment and monitoring of student learning based on the competence approach;
- apply scientific methods of cognition in the educational process and various approaches to solving problems in pedagogical activity.

Let's consider the tasks of each bachelor's practice.

### *1. Propaedeutic pedagogical practice.*

To achieve the goal of propaedeutic pedagogical practice specified in the Practice Program, students of the third year on the basis of practice must complete the following tasks:

1. Draw up a perspective plan for the internship and keep a psychological and pedagogical diary of the student's observations.
2. Familiarize yourself with the organization of the educational process of the practice base.
3. Familiarize yourself with the material and technical base of the mathematics office.
4. Get acquainted with the school documentation and the work of the methodical association of mathematics teachers of the practice base.
5. Get acquainted with the educational documentation of the mathematics teacher (thematic plan, calendar plan, synopsis of the lesson/extracurricular activity on the subject, etc.) and the class teacher (plan of educational work, plan of the synopsis of the educational event, etc.).
6. Visit the mathematics lessons of different teachers of the practice base from the 5th to the 9th/11th grades and conduct an analysis of the visited lessons.
7. Attend an extracurricular event in mathematics in one of the classes of the practice base and conduct an analysis of the attended event.
8. Attend an educational event in one of the classes of the practice base and conduct an analysis of the attended event.
9. Take part in conducting individual and group additional classes for students.
10. Check the student's written independent works: homework; independent work of a controlling nature; control work, etc.

11. Prepare an extended outline of the lesson and conduct a test lesson in mathematics with subsequent self-analysis.

All the work is done by students in consultation with the methodologist from the department and teachers of the practice base involved in its implementation. Evaluation of practice is carried out by the methodologist of the department based on the results of its completion by the student and the reporting documentation submitted by him:

1. Psychological and pedagogical diary of student observations.
2. Analysis of the attended mathematics lesson.
3. Analysis of the attended extracurricular activity in mathematics.
4. Analysis of the attended educational event.
5. Synopsis of the conducted lesson with self-analysis, evaluated by the methodologist of the department or the teacher of mathematics.
6. A report on the completed work, signed by the mathematics teacher, the class teacher and the methodologist of the department.

The student can submit additional documentation to the report if he performed special types of activities.

## *II. Industrial practice 1.*

To achieve the goal of this practice, specified in the Practice Program, students, having received sufficient theoretical training in the disciplines of psychological and pedagogical training of the cycle of disciplines of professional and practical training, pass it at the second level of full general secondary education (grades 5-9) and have perform the following tasks:

1. Make an individual plan for the student intern for the entire period of practice, and keep a diary in which to record the implementation of the planned work, the results of observing the lessons of teachers and student interns, the class teacher, etc.
2. Study the class team (in the first week of practice, attend all lessons according to the class schedule; attend extracurricular activities, communicate with teachers, class teacher, students, etc.) to which the student is sent for practice according to the order of the director of the educational institution.
3. To attend all the lessons of the mathematics teacher in order to determine the methodological features of his work in this class group during practice.
4. Prepare lesson notes and conduct 8 credit lessons in mathematics of various types.
5. Check student works: homework; independent work; control works, etc.
6. To prepare and conduct 1 credit extracurricular activity in mathematics (circle meeting, mathematical competitions, optional class, etc.).
7. Perform the duties of an assistant class teacher.

8. To prepare and conduct 1 credit educational activity in accordance with the plan of educational work of the class teacher.
9. Attend credit lessons of other intern students during the internship.
10. Conduct pedagogical observation of the selected student of the class team, with the aim of writing his psychological and pedagogical characteristics, in accordance with the methods of such research.

As during the previous practice, the students perform all the work in consultation with the methodologist from the department and the mathematics teacher of the practice base, the class teacher. Evaluation of practice is carried out by the methodologist of the department based on the results of its completion by the student and the reporting documentation submitted by him:

1. Psychological and pedagogical diary of student observations.
2. Eight grading notes of various types of mathematics lessons, evaluated by a methodologist or mathematics teacher.
3. Synopsis of 1 extracurricular activity in mathematics, evaluated by a methodologist or a mathematics teacher.
4. Synopsis of 1 credit-taking educational event, evaluated by the class teacher.
5. Analysis of 1 attended mathematics lesson of another intern student.
6. Psychological and pedagogical characteristics of the student of the class, signed by the psychologist of the institution (if available), the class teacher.
7. A report on the completed work, signed by the mathematics teacher, the class teacher and the methodologist of the department.

Note that the student also can submit other documentation to the report, if he performed special types of activities.

### *III. Industrial practice 2.*

To achieve the goal of this industrial practice specified in the Practice Program, students of the fourth year, having received sufficient theoretical training in the disciplines of psychological and pedagogical training of the cycle of disciplines of professional and practical training, pass it at the third level of full general secondary education (grades 10-11) and perform tasks similar to tasks of previous practice. However, there are some differences:

1. By order of the director of the practice base, students are assigned to a class (grades 10-11) in which mathematics is studied at the standard level.
2. Also, students do not work as assistants to the class teacher, but perform all his functions, and conduct psychological and pedagogical observation of the entire class group with subsequent writing of the psychological and pedagogical characteristics of this group.
3. Since bachelor's students conduct scientific research for the performance of bachelor's work related to the methodology of teaching mathematics in secondary education institutions, one of the practical

tasks is to conduct a pedagogical experiment within the scope of the subject of the bachelor's work.

Corresponding differences are also reflected in students' reports.

Let's consider the tasks of each practice of the master's degree.

### *I. Industrial practice 1.*

To achieve the goal of this industrial practice specified in the Practice Program, first-year master's students, having received sufficient theoretical training in the disciplines of psychological and pedagogical training of the cycle of professional and practical training disciplines in the bachelor's degree, undergo practice at the third level of full general secondary education (grades 10-11). By order of the director of the practice base, students are assigned to a class (grades 10-11) in which mathematics is studied at a specialized level or at an advanced level. As for the tasks and reporting, they are similar to the tasks of industrial practice 2 of the bachelor's degree. The difference in the number of prepared and completed credit lessons in mathematics (8 lessons in algebra and the beginnings of analysis, 4 lessons in geometry) and in writing a psychological and pedagogical analysis of the educational event, signed by the class teacher or deputy director for educational work.

### *II. Industrial practice 2.*

To achieve the goal of this industrial practice specified in the Practice Program, students of the first year of the master's degree, having received sufficient theoretical training in the disciplines of psychological and pedagogical training of the cycle of professional and practical training disciplines, and having completed pedagogical practice at all levels of the institution of general secondary education of the I-III degrees, pass practice in "private schools" (non-state institutions owned by private individuals, charitable or educational organizations, foundations). All such institutions are distinguished from others by greater autonomy in the organization of the educational process, financial support and, as a result, have significant differences both in the technical support of the educational process, the schedule of the educational process, and in the selection of the content of education, forms of education, methods of education, etc.

Therefore, the task and reporting of this practice, on the one hand, involves a set of similar tasks of all previous practices. On the other hand, each of them has its own characteristics, taking into account the author's concepts of the educational process of such educational institutions.

### *III. Industrial practice 3.*

Since the basis of this practice is an institution of professional (vocational and technical) education, then, in accordance with the goal, it provides the following tasks:

1. Familiarize yourself with the organization of educational, methodical, scientific and educational work of the specialized department of

the practice base, with the requirements and regulatory documents regulating their implementation.

2. Attend classes, educational activities, group classes and seminars held by the department's teachers during the internship period.
3. Perform a psychological and pedagogical analysis of the classes attended.
4. To prepare and conduct: an educational session, an optional session (a group meeting) and an educational event, perform their psychological and pedagogical analysis.
5. To take part in the report-scientific student conference (scientific seminar meeting), to prepare the theses of the report.
6. Prepare a scientific publication for publication.
7. Individual task. Conduct a pedagogical experiment related to the topic of the master's thesis (applies to those whose topic of the master's thesis is related to the methodology of teaching mathematics in a professional education institution).

According to the tasks of practice, students prepare report documentation:

1. Student-intern's report on the work done.
2. Two summaries of credit classes (lecture and practical class).
3. Psychological and pedagogical analysis of the attended class.
4. Psychological and pedagogical analysis of the conducted educational event.
5. Synopsis of the conducted extracurricular educational event (circle, seminar, etc.).
6. Abstracts of a speech at a student scientific conference or a meeting of a scientific circle or problem group based on the results of research on the topic of the master's thesis.

Evaluation of the results of students' activities during practice is carried out according to the traditional scale of the university: "excellent" (90-100 points), "good" (70-89 points), "satisfactory" (60-69 points), "credited" (60-100 points).

Each of the practice tasks is evaluated from 0 to 100 points. The grade "excellent" is given if at least 90% of the tasks are completed perfectly. The grade "good" is given if at least 70% of the tasks are completed excellently and well. The grade "satisfactory" is given if at least 60% of tasks are completed excellently, well or satisfactorily.

**Conclusions.** In this article we highlighted the peculiarities of the practical training of a future teacher of mathematics at Dragomanov Ukrainian State University at the current stage. Taking into account the fact that the process of reforming higher education in Ukraine is ongoing, accordingly changes will occur in the process of conducting practices. The authors are ready for discussions and exchange of experience with colleagues regarding the organization and implementation of practical training of students at the bachelor's and master's level, and are open to constructive comments and suggestions regarding this topic