

UDC 378.147:[37.011.3-051:51

DOI <https://doi.org/10.31470/2415-3729-2022-16-90-109>

Formation of Readiness of Future Mathematics Teachers to Teach Mathematical Logic and Theory of Algorithms

Oksana Zhernovnykova

Doctor of Science in Pedagogy (DSc), Professor,
Head of the Department of Mathematics,
H.S. Skovoroda Kharkiv National Pedagogical University,
✉ 29, Alchevskykh Str, Kharkiv, Ukraine, 61002
E-mail: oazhernovnykova@gmail.com
ORCID: <http://orcid.org/0000-0002-5383-4493>

Tamara Deynichenko

Doctor of Philosophy in Pedagogy (PhD),
Associate Professor of the Department of Mathematics,
H.S. Skovoroda Kharkiv National Pedagogical University,
✉ 29, Alchevskykh Str, Kharkiv, Ukraine, 61002
E-mail: deinichenkot@hnpu.edu.ua
ORCID: <https://orcid.org/0000-0003-4117-1503>

Gennadiy Deynichenko

Doctor of Philosophy in Pedagogy (PhD),
Associate Professor of Department of Physics and Chemistry,
H.S. Skovoroda Kharkiv National Pedagogical University,
✉ 29, Alchevskykh Str, Kharkiv, Ukraine, 61002
E-mail: gennadii.deinychenko@hnpu.edu.ua
ORCID: <https://orcid.org/0000-0002-1497-0513>

Oleksandr Chibisov

Doctor of Philosophy in Physics and Mathematics (PhD),
Associate Professor of the Department of Mathematics,
H.S. Skovoroda Kharkiv National Pedagogical University,
✉ 29, Alchevskykh Str, Kharkiv, Ukraine, 61002
E-mail: alexandrchibisov@hnpu.edu.ua
ORCID: <https://orcid.org/0000-0001-9670-3912>

Date of receipt of the article: November 15, 2022
Article accepted for publication: December 15, 2022

Формування готовності майбутніх учителів математики до навчання математичної логіки та теорії алгоритмів

Оксана Анатоліївна Жерновникова

доктор педагогічних наук, доцент, завідувач кафедри математики,
Харківський національний педагогічний університет імені
Г.С. Сковороди,
✉ вулиця Алчевських, 29, Харків, Україна, 61002

Тамара Іванівна Дейніченко

кандидат педагогічних наук, доцент кафедри математики,
Харківський національний університет імені Г.С. Сковороди,
✉ вул. Алчевських, 29, Харків, Україна, 61002

Геннадій Володимирович Дейниченко

кандидат педагогічних наук, доцент кафедри фізики і хімії,
Харківський національний педагогічний університет імені
Г.С. Сковороди,
✉ вул. Алчевських, 29, Харків, Україна, 61002

Олександр Дмитрович Чібісов

кандидат фізико-математичних наук, доцент кафедри
математики,
Харківський національний університет імені Г.С. Сковороди,
✉ вул. Алчевських, 29, Харків, Україна, 61002

Date of receipt of the article: November 15, 2022
Article accepted for publication: December 15, 2022

Abstract

The paper is dedicated to the issue of finding ways to increase the efficiency of teaching mathematical logic and the theory of algorithms in pedagogical higher education institutions through the formation of future teachers' professional readiness for teaching the specified type of activity. **The purpose of the study** was scientific justification and experimental verification

of the technology of training students of pedagogical institutions of higher education to study mathematical logic and the theory of algorithms. **Methods.** During research, a complex of general scientific and special methods aimed at achieving the purpose (theoretical (analytical, retrospective); empirical (diagnostic, observational, praxemetric); pedagogical experiment; statistical processing of empirical data) were used. **The results.** In the paper the purpose and content of training students of pedagogical higher education to study mathematical logic and the theory of algorithms have been *defined*, that involves the acquisition by students of higher education of knowledge of the basics of science, the formation of special abilities and skills of using its methods, the acquisition of experience of creative activity, the formation of emotional and valuable experience attitude to activity. The structure of the future mathematics teacher's readiness for professional activity has *characterized*, which is formed by motivational-axiological, content-activity, professional-personal components. It has been proven that each of the structural components of readiness has its own peculiarities in the learning process and requires the development of their scientific and technological support in order to form the readiness of future teachers of mathematics to learn mathematical logic and the theory of algorithms. The paper *highlights* the issue of developing scientific and technological support for appropriate training; the influence of the implementation of the proposed technological support on the level of students' readiness to learning mathematical logic and the theory of algorithms has been *revealed*. **Conclusions.** Readiness as an integral criterion of quality assessing of the activity of a future teacher of mathematics to mathematical logic and the theory of algorithms involves the formation of positive motives, significant for the implementation of this type of activity, personal qualities, possession of the means to achieve the goal. The performed research does not cover the issue; it may be promising to further study the issues of

differentiating the training of higher education students for the specified type of activity.

Key words: mathematical logic, theory of algorithms, training, professional readiness, scientific and technological support.

References

1. Huz, N.L., Deinichenko, T.I. & Zhernovnykova, O.A. (2018). Pidhotovka maibutnix uchyteliv matematyky do navchannia matematychnoi lohiky i teorii alhorytmiv. [Training future mathematics teachers for teaching mathematical logic and theory of algorithms]. *Naukovo-doslidna robota studentiv yak chynnyk udoskonalennia profesiinoi pidhotovky maibutnoho vchytelia – Scientific and research work of students as a factor in improving the professional training of the future teacher*, 16, 61-67 [in Ukraine].
2. Deinychenko, V.H. (2014). Hotovnist yak rezultat pidhotovky maibutnix uchyteliv do navchannia starshoklasnykiv proektnoi diialnosti [Readiness as a result of training future teachers to teach high school students project activities]. *Naukovi pratsi – Scientific works*, 234 (246), 119–123 [in Ukraine].
3. Deinichenko, T.I. & Tubaiev, M.D. (2015). Stvorennia mikrohrup studentiv yak osnova dlia dyferentsiatsii navchannia matematychnoi lohiky v pedahohichnomu VNZ [The creation of microgroups of students as a basis for differentiating the teaching of mathematical logic in a pedagogical university]. *Kafedra pedahohiky v systemi pidhotovky maibutnoho vchytelia (do 165-richchia vid dnia zasnuvannia kafedry): zbirnyk tez dopovidei naukovo-praktychnoi konferentsii vykladachiv, doktorantiv i aspirantiv kafedry zahalnoi pedahohiky ta pedahohiky vyshchoi* (pp. 58-59). Kharkiv: KhNPU [in Ukraine].
4. Deinichenko, T.I. & Deinychenko, H.V. (2021). Matematychna lohika i teoriia alhorytmiv: navchalno-metodychnyi kompleks dlia bakalavrantiv spetsialnosti «014 Serednia osvita (matematyka)» Kharkivskoho natsionalnoho

pedahohichnoho universytetu imeni H.S. Skovorody [Mathematical logic and theory of algorithms: educational and methodological complex for undergraduates of the specialty «014 Secondary education (mathematics)» of H.S. Skovoroda Kharkiv National Pedagogical University]. Kharkiv: KhNPU [in Ukraine].

5. Deinychenko, H. V. (2009). Pidhotovka studentiv pryrodnycho-matematychnykh spetsialnostoni do tekhnichnoho konstruiuvannia u vyshchykh pedahohichnykh navchalnykh zakladakh [Preparation of students of natural and mathematical specialties for technical design in higher pedagogical educational institutions]. *Extatnded abstract of candidate's thesis*. Kharkiv [in Ukraine].

6. Zhernovnykova, O.A., Shtefan, L.A., & Fazan, V.V. (2017). Formuvannia hotovnosti maibutnikh uchyteliv matematyky do navchalnoho proektuvannia [Forming future mathematics teachers' instructional design skills]. *Nauka i osvita: naukovopraktychnyi zhurnal – Science and education: a scientific and practical journal*, 10, 74–81. DOI: <https://doi.org/10.24195/2414-4665-2017-10-9> [in Ukraine].

7. Zhernovnykova, O.A. & Prostakova, Yu.S. (2021). Metodyka formuvannia hotovnosti studentiv-matematykiv do vyvchennia matematychnykh dystsyplin [Methods of formation of the students-mathematicians' readiness to study mathematical disciplines]. *Profesiina osvita: metodolohiia, teoriia ta tekhnolohii – Professional education: Methodology, Theory and Technologies*, 13, 110–123 [in Ukraine].

8. Zhukova, O.A. (2012). Pidhotovka studentiv VNZ do innovatsiinoi diialnosti zasobamy ihrovykh tekhnolohii. [Preparation of university students for innovative activities by means of game technologies]. *Naukovi zapysky kafedry pedahohiky – Scientific notes of the department of pedagogy*, 29, 44-51 [in Ukraine].

9. Malykhin, O.V. (2009). Teoretyko-metodolohichni zasady orhanizatsii samostiinoi navchalnoi diialnosti studentiv vyshchykh pedahohichnykh navchalnykh zakladiv [Theoretical

and methodological principles of the organization of independent educational activities of students of higher pedagogical educational institutions]. *Extended abstract of Doctor's thesis*. Kharkiv [in Ukraine].

10. Nikitchenko, L.O. (2012). Profesiina pidhotovka maibutnix uchyteliv pryrodnychykh dystsyplin u protsesi fakhovoi praktyky [Professional training of future teachers of natural sciences in the process of professional practice]. *Extended abstract of candidate's thesis*. Vinnytsya [in Ukraine].

11. Piekhota, O.M. et al. (2001). Osvitni tekhnolohii [Educational technologies]. Kyiv: A.S.K. [in Ukraine].

12. Dubaseniuk, O.A. et al. (2006). Profesiino-pedahohichna osvita: suchasni kontseptualni modeli ta tendentsii rozvytku [Professional and pedagogical education: modern conceptual models and development trends]. Zhytomyr : Vyd-vo ZhDU im. I. Franka [in Ukraine].

13. Deynychenko, G. V., Deinychenko V. G. & Deynichenko T. I. (2018). Training the students of natural-mathematical specialties in engineering design at higher institutions of pedagogical education. *Educational Studios: Theory and Practice: monograph*. Prague-Vienna, 315-322.

Introduction

The characteristic features of the development of the problem of training higher educational institution students for teaching mathematical logic and the theory of algorithms at this point of modernization and conceptual rethinking of the teachers' professional and pedagogical training based on the principles of humanization and democratization, the introduction of innovative forms and methods of teaching, its variability and diversification, that requires new approaches, determination of priorities in education aimed at the formation of a creative personality, provision of conditions for revealing abilities, use of experience, satisfaction of educational needs.

The study of mathematical logic in pedagogical institutions of higher education is connected with the natural growth of its role in education, its application in computer science, the theory of logic circuits, automation, economics, linguistics, etc. Taking into account the interdisciplinary importance of mathematical logic, in modern conditions there is a need for students of higher education of major «014.04 Secondary education (mathematics)» of pedagogical institutions of higher education to thoroughly acquire it as a component of their professional training.

In the context of research of the future mathematics teachers' professional training the works of scientists who study the problems of forming the readiness of future teachers of natural and mathematical disciplines for their professional activity (Deinychenko, 2009; Zhernovnykova, Shtefan & Fazan, 2017; Zhernovnykova & Prostakova (2021); Nikitchenko, 2012 et al.), problems of professional training and becoming a teacher (Dubaseniuk et al., 2006; Deinychenko et al., 2018; Deinychenko, 2014 et al.), improvement of general pedagogical training of students in the conditions of a higher educational institution (Zhukova, 2012; Malykhin, 2009; Piekhota, 2001 et al.) are of particular importance. However, the lack of fundamental research that addresses the issue of training students of pedagogical institutions of higher education in mathematical logic and the theory of algorithms, the need for the the mentioned problems' to be solved by pedagogical science and practice, determine the relevance and at the same time the novelty of the research. Therefore, the vector of research is aimed at achieving the goal of scientific justification and experimental verification of the technology of training students of pedagogical institutions of higher education to teach mathematical logic and the theory of algorithms.

The purpose of this paper: to determine the content of the training of students of pedagogical institutions of higher education in mathematical logic and the theory of algorithms; characterize the structure of the future mathematics teacher's

readiness for professional activity; highlight the issue of developing scientific and technological support for appropriate training and reveal the impact of its implementation on the level of students' readiness to teach mathematical logic and the theory of algorithms.

Methods

In order to solve the research tasks, general scientific and special methods, such as theoretical (analytical, retrospective) to study the theoretical aspects of the problem, definition of the conceptual and categorical apparatus, genesis of the studied phenomena; empirical (diagnostic (questionnaires, surveys, interviews, control papers, testing), observational (direct, indirect, included observation, retrospective analysis of one's own pedagogical practice), praxemetric (analysis of the products of educational and cognitive activity of the acquirers, analysis of best pedagogical experience) to establish levels the formation of students' readiness to learn mathematical logic and theory of algorithms; a pedagogical experiment to identify the effectiveness of the implementation of the proposed technology for training students to study mathematical logic and theory of algorithms; mathematical (processing of empirical data) were applied.

The pedagogical experiment, according to the general purpose of the study, included an experimental verification of the scientific and technological support for the training of future mathematics teachers in mathematical logic and the theory of algorithms. The experimental work was carried out using the «time delay» method (Deinychenko, 2009) under the conditions of the natural educational process in the teaching of mathematical logic and the theory of algorithms at the H. S. Skovoroda Kharkiv National Pedagogical University (KhNPU) during 2017-2021. In total, 148 students of the first (bachelor) level of higher education, of major «014.04 Secondary education (mathematics)» of KhNPU have been involved.

Results and discussion

The solution of the issues of future mathematics teachers training to study mathematical logic and the theory of algorithms

is related to the scientific justification of conceptual approaches, which include, first of all, activity-personal and competency based learning (Deinychenko, 2009; Zhernovnykova et al., 2017; Malykhin, 2009 et al.).

From the point of the activity-personal approach, the essence of training a future teacher of mathematics to teach mathematical logic and the theory of algorithms consists in rethinking the concept of training from memorizing certain knowledge to acquiring the skills to use it for the *purpose* of self-determination and self-realization in professional activity.

As is known, the competency based learning focuses on the result of education, and the aim of training is not the acquisition of a sum of knowledge, but the formation of an individual's ability to act in various situations, since professional competence is considered the ability of an individual to perform his professional duties with the required quality. To be competent means to be able to mobilize the knowledge and experience gained in the existing situation, therefore, in the conditions of a mathematics teacher's professional competence, mathematical competence is important as an integrative professional and personal characteristic of the subject of activity, which allows him to creatively develop using mathematical logic and the theory of algorithms to solve didactic and methodical tasks.

Therefore, conceptual approaches determine both the purpose and, indirectly, the content of the training of future teachers to teach mathematical logic and the theory of algorithms.

The analysis of professional profiles of a graduate of a pedagogical institution of higher education, normative documents, psychological and pedagogical, scientific literature provides reasons to highlight the following components in the content of the training of students of higher education in mathematical logic and the theory of algorithms (Bilaniuk, 2003; Deinichenko & Deinychenko, 2021; Huz', Deinichenko & Zhernovnykova, 2018 et al.):

- acquiring of knowledge by the students from the basics of science (formalization of mathematical language, formalized axiomatic method of building mathematical theories, which also includes logical means and their components: language, axioms, rules of conclusions, problems of non-contradiction, completeness, solvability of theories);
- formation of abilities and skills to use methods of mathematical logic to justify or refute a wide variety of statements and hypotheses; analysis of the logical structure of reasoning; analysis and synthesis of digital automata, elements of modern electronic computing technology, possibilities of automation of logical processes, research of artificial intelligence problems for conscious use of modern information technologies;
- gaining experience in creative activity: acquiring the concepts and methods of mathematical logic, which have both subjective and objective novelty and can be applied in school practice to implement the applied orientation of the course;
- formation of the experience of an emotional and valuable attitude to activity: the development of a conscious positive attitude to mathematical logic, the formation of a scientific worldview of students, a view of mathematics as a single deductive system with the aim of their formation as subjects of educational and professional activity.

The analysis of the main studies and publications of the research issue (Deinychenko, 2014; Deinychenko, 2009; Zhernovnykova, Shtefan, & Fazan, 2017; Zhernovnykova & Prostavkova, 2021; Nikitchenko, 2012 et al.) has provided grounds for considering the appropriate training of students in natural mathematical specialties as a learning process that ensures the readiness of future teachers for educational activities in mathematical logic and the theory of algorithms within the limits of their professional competence.

We consider the readiness of students of natural and mathematical specialties to teach mathematical logic and the theory of algorithms as an essential characteristic of the result of

the training of future teachers, that includes components that have their own characteristics: *motivational and axiological*, which involves a positively perceived system of motives as certain values; *content-activity*, which involves updating the subjective experience of students and including it in the content of training in mathematical logic; *professional and personal*, which ensures the process of active qualitative changes of the personality in teaching mathematical logic and the theory of algorithms.

During the research, scientific and technological support for the training of students of natural and mathematical specialties of pedagogical institutions of higher education in mathematical logic and the theory of algorithms has been developed.

By the *scientific and technological provide* of the training of mathematicians we mean a set of content and procedural means that contribute to the formation of the readiness of future teachers to teach mathematical logic and the theory of algorithms (Deinychenko, 2009).

Ensuring the *motivational and axiological component* of readiness to teach mathematical logic and the theory of algorithms involves the formation of positive motives of students' cognitive activity. At the same time the results of the diagnosis of the initial state of formation of the motivational-value component of readiness proved that, in general, students have a positive focus on studying mathematical logic and the theory of algorithms.

The development of positive motivation for studying in the performed research is being by the following way (Deinychenko, 2009; Huz', Deinichenko & Zhernovnykova, 2018):

- firstly, the organization of targeted information and explanatory work, which involved the argumentation of the immediate target and final aim of education; clarification of the necessity and practical importance of studying the elements of mathematical logic for the student in further professional activity;
- secondly, the formation of the cognitive and professional interest of future teachers in mathematical logic and the theory

of algorithms, which was involved the creation the following situations:

- interest, surprise (use of interesting facts from the history of the development of science);
- novelty, relevance, relation of educational material with discoveries and inventions in science and technology (selection of certain examples, facts, illustrations from periodicals, television, radio, Internet, etc.);
- situations of success (feasibility of tasks, acquiring of educational material gradually taking into account the area of actual development, differentiated assistance to students, etc.);
- game situations (application in the educational process of relationships and conditions of real life, such as: analysis, solution of a specific situation, business and organizational-activity games).

Ensuring the content-activity component of the readiness of future teachers to teach mathematical logic involved, firstly, the design and construction of a curriculum for a subject in mathematical logic and the theory of algorithms for students of higher education of major «014.04 Secondary education (mathematics)», which included (Deinichenko & Deinychenko, 2021):

- clarifying the goals and content of the training of future teachers in mathematical logic and theory of algorithms: credits include content modules such as algebra of statements, calculus of statements, logic of predicates, mathematical theories of the first order, elements of the theory of algorithms; topics of lectures and practical classes are indicated for each credit;
- developing of differentiated tasks for organizing students' independent work (oral and written), tasks in test form to control their educational and cognitive activities have been;
- clarifying the criteria for evaluating students' educational achievements have been; determining of points awarded to students for the completion of meaningful modules, etc.

Secondly, during the development of lecture-practical classes in the course of mathematical logic and the theory of algorithms, methods of simulation learning technology (SLT) were used, the purpose of which were the formation of students' value orientations, relationships, culture of communication, thinking, methods of activity, certain volitional efforts through the use of in the educational process of relations and conditions of real life.

It has been proven (Deynychenko et al., 2018; Piekhota et al., 2001 et al.) that the organization of effective training with SLT, aimed at the holistic development of the individual, is achieved at the expense of the organization of collective thinking by solving problem situations, due to which the assimilation of new knowledge and skills becomes a content-forming moment of personal development; cognition becomes desired, voluntary, acquires a positive emotional colour, stimulates and supports willful efforts.

Ensuring the *professional and personal component* of readiness included in the formation of significant personal qualities that contribute to the effectiveness of activities related to the study of mathematical logic and the theory of algorithms, that was ensured through the learning process itself, its organization, methods, forms, since the skills of goal setting and choice of means are formed in educational work its achievements, which develop activity, independence, perseverance in work, a sense of responsibility, etc.

Based on the purpose, tasks and specifics of the relevant training process, we consider it expedient to use group forms of organization of higher education applicants' educational and cognitive activities, which are characterized by direct interaction, joint coordinated work in educational microgroups and are considered by us as a means of optimizing the educational process, which contributes to increasing the level of readiness to the teaching of mathematical logic and the theory of algorithms of each seeker of higher education.

In the organization of group activities of students, we proceeded from the fact that numerous studies by scientists (Deinichenko & Tubayev, 2014; Deinychenko, 2009; Zhukova, 2012; Piekhota et al., 2001 et al.) have proven the positive educational impact of group forms organization of students' educational and cognitive activities on the formation of personalities' qualities significant in educational activities, in particular, in mathematical logic and the theory of algorithms:

- during group work, the activity of all its performers is intensified, since one of the most important characteristics of an individual in a group is that it turns to his/her group as a source of orientation in the surrounding reality;
- intensification of the cognitive activity of those who are studying contributes to the improvement of success and effectiveness of training, which affects the growth of the volume of work performed, that is, its intensity; the feeling and awareness of this instills faith in one's own strength, educational opportunities, as a result of which self-confidence, work capacity, and perseverance in achieving the final goal increase;
- satisfying the need for communication contributes to the formation of a general positive attitude to learning, which significantly increases cognitive interest, causes the need for self-study creative work, affects the development of cognitive activity;
- the multiple individuals' attitudes towards themselves and the surrounding environment are formed by means of communication: gaining experience of conscious behaviour, such personal qualities as emotional sympathy, empathy are developed and formed, that contributes to the improvement of the psychological climate, creates a comfortable environment, increasing the development opportunities of each member of a study group;
- under the conditions of organizing training on a group basis, that is, when an individual becomes the organizer of the educational process and takes responsibility for the results of a common cause, organizational skills, business acumen,

entrepreneurship are formed, that is, social qualities related to human relationships: the ability to agree on joint affairs tactfully, share responsibilities among themselves, listen to the opinions of others, build one's own behaviour in accordance with their position; a sense of duty is formed in the division of labour and mutual control, patience, endurance, etc.;

– communication and joint activities provide opportunities for each student to participate in the discussion of the problem to the extent that its own development allows him/her, acting in the role of a leader, opponent, listener, which contributes to the formation of adequate self-esteem, the development of self-control skills, encourages reflection: better awareness methods that led to the result, systematization, generalization of methods of activity, that is, it provides opportunities for holistic development of the individual.

All this points to the expediency of using group forms of organizing educational and cognitive activities of seekers of higher education in the process of training for teaching mathematical logic and the theory of algorithms.

By the group form of educational activity of the students, we mean the one that involves the division of the academic group into microgroups of 2-5 people (more often 4 people each) and is characterized by direct interaction and joint coordinated activity of students in microgroups (Deynichenko, 2009).

The organization of educational activities in a group form provides the teacher possibility of individualize studying, taking into account individual characteristics and differentiated requests of students in the division into groups, regulating the degree of assistance to educational groups in completing tasks.

Based on the purpose, tasks and specifics of the process of training for teaching mathematical logic and the theory of algorithms, in the performed research, an option of microgroups of students of amount 3-5 people was chosen for six months. The organization of educational group work in classes on mathematical logic and the theory of algorithms was carried out

according to the directions: work of heterogeneous groups with a leader, homogeneous groups without a leader, pair work.

The implementation of distance learning (in synchronous mode) into the educational practice provides opportunities for organizing group work of applicants through the activation of breakout rooms of the different video conference services, that develops communication, teamwork, skills among applicants of higher education. At the same time, we understand the synchronous learning mode as the interaction between the subjects of distance learning, during which the participants are simultaneously in the electronic educational environment or communicate using the means of audio and video conference, i.e., the cooperation of the subjects of the educational process under such conditions takes place in the real time mode.

The efficiency of training students of higher education of the first (bachelor) level of education of major «014.04 Secondary education (mathematics)» for teaching mathematical logic and the theory of algorithms involved the revealing of the levels of their readiness to study this course and was evaluated according to the criteria of the formation of readiness, covering several aspects: positive attitude to activity, formation of mental actions, scientific outlook, necessary knowledge, abilities, skills, personal qualities that make it possible to achieve success in professional activity.

The comparative and general results of the distribution of students in experimental group according by the levels of readiness to teaching mathematical logic and the theory of algorithms at the beginning and end of the experiment are presented in Fig. 1.

The obtained experimental data shows the significant impact of the developed scientific and technological support on reducing the number of students with an elementary level of readiness for teaching mathematical logic and theory of algorithms by 31,7%.

During the performed pedagogical experiment, the number of students with the high level of readiness has increased (increasing is reached almost 17%).

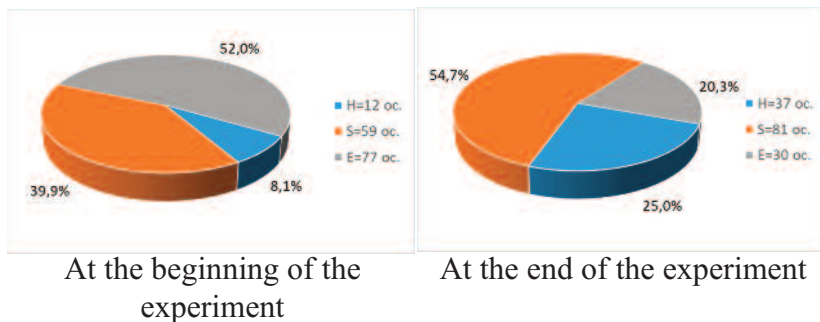


Fig. 1. Readiness level of the students of the experimental groups (in percentages of the 148 participants), where H - high, S - sufficient, E - elementary level

The performed pedagogical experiment has revealed that the developed scientific and technological support of training the future teacher of mathematics for teaching mathematical logic and the theory of algorithms ensures the formation of positive motivation for acquiring professional knowledge, necessity of self-improvement; involves the actualization of personal experience and its inclusion in the content of training; is aimed at the development of personality, as it contributes to the identification of individual results of educational and cognitive activities of students in mathematical logic and the theory of algorithms and provides for their correction.

Conclusions

The analysis of scientific research revealed the essence of training students of higher education to teach mathematical logic and the theory of algorithms as a studying process, which ensures the readiness of future teachers for the activity of a mathematics teacher within the limits of their professional competence as a range of duties.

The result of training students to teach mathematical logic and the theory of algorithms is the corresponding professional readiness.

The *readiness* of the student of higher education to teach mathematical logic and the theory of algorithms is determined as an essential characteristic of the result of its subject-methodical training, the structure of which consists of a *motivational-value* component (a positively perceived system of motives as certain values); *content-activity* component (system of knowledge, abilities, skills; actualization of subject experience of applicants, its inclusion in the content of training) and *professional-personal* component (personal qualities, potential opportunities).

It has been proven that each of the structural components of readiness has its own peculiarities in the learning process and requires the development of their scientific and technological support in order to form the readiness of future mathematics teachers to teach mathematical logic and the theory of algorithms.

Experimental verification of the developed scientific and technological support for the appropriate preparation of the future teacher of mathematics for teaching mathematical logic and the theory of algorithms revealed its positive effect on increasing the levels of readiness for the specified type of activity.

At the same time, the performed research does not cover the issue totally and it may be promising to further study the issues of differentiating the training of higher education students for the learning of mathematical logic and the theory of algorithms.

**Жерновникова О. А., Дейніченко Т. І., Дейниченко Г. В.,
Чібісов О. Д.**

**Формування готовності майбутніх учителів математики до
навчання математичної логіки та теорії алгоритмів**

Анотація

Стаття присвячена проблемі пошуку шляхів підвищення ефективності викладання математичної логіки і теорії алгоритмів

в педагогічних ЗВО через формування в майбутніх учителів професійної готовності до навчання означеного виду діяльності. **Метою дослідження** було наукове обґрунтування й експериментальна перевірка технології підготовки здобувачів педагогічних закладів вищої освіти до навчання математичної логіки і теорії алгоритмів. **Методи.** У процесі дослідження застосовано комплекс загальнонаукових і спеціальних методів, спрямованих на досягнення мети: теоретичні (аналітичний, ретроспективний); емпіричні (діагностичні, обсерваційні, праксеметричні); педагогічний експеримент; статистичне опрацювання емпіричних даних. **Результати.** У статті *визначено* мету і зміст підготовки здобувачів вищої освіти педагогічного ЗВО до вивчення математичної логіки і теорії алгоритмів, що передбачає засвоєння здобувачами вищої освіти знань з основ науки, формування спеціальних умінь і навичок використання її методів, набуття досвіду творчої діяльності, формування досвіду емоційно-ціннісного ставлення до діяльності; *схарактеризовано* структуру готовності майбутнього вчителя математики до професійної діяльності, яку утворюють мотиваційно-аксіологічний, змістово-діяльнісний, професійно-особистісний компоненти. Доведено, що кожен зі структурних компонентів готовності має свої особливості в процесі навчання й потребує розробки їх науково-технологічного забезпечення задля формування готовності майбутніх учителів математики до навчання математичної логіки та теорії алгоритмів. У статті *висвітлено* питання розробки науково-технологічного забезпечення відповідної підготовки; *виявлено* вплив реалізації запропонованого технологічного забезпечення на рівні готовності здобувачів до навчання математичної логіки і теорії алгоритмів. **Висновки.** Готовність як інтегральний критерій оцінки якості діяльності майбутнього вчителя математики до математичної логіки та теорії алгоритмів передбачає сформованість позитивних мотивів, значущих для здійснення цього виду діяльності особистісних якостей, володіння засобами досягнення мети. Здійснене дослідження не вичерпує поставленої проблеми; перспективним може бути подальше вивчення питань

диференціації підготовки здобувачів вищої освіти до означеного виду діяльності.

Ключові слова: математична логіка, теорія алгоритмів, підготовка, професійна готовність, науково-технологічне забезпечення.