

ABSTRACT

dissertations on the topic "The future primary school teacher's development of methodological and mathematical literacy in the study of algorithms" for the degree of the doctor of philosophy (PhD) in the specialty "6D010200 - Pedagogy and methods of primary education" by Astambayeva Zhupat Kanapyanovna

Research theme: The future primary school teacher's development of methodological and mathematical literacy in the study of algorithms

The purpose of the research: formulating the theoretical justification for the development of methodological and mathematical literacy of the future primary school teachers in the study of algorithms, to develop a methodological system and testing its effectiveness with the help of a pedagogical experiment.

The objectives of research:

1) to define the structures and functions of the concepts of "literacy", "mathematical literacy", "methodological literacy", "methodological and mathematical literacy", "methodological and mathematical literacy of the future primary school teachers";

2) to determine the possibilities of developing methodological and mathematical literacy of the future primary school teachers;

3) to develop the structural and meaningful model for the development of methodological and mathematical literacy of the future primary school teachers;

4) to develop a system for the development of methodological and mathematical literacy of the future primary school teachers, approbation in a experimental research and preparation scientifically based recommendations.

Research methods: theoretical (analysis of philosophical, psychological and pedagogical scientific and methodological literature, collection of best practices, generalization, comparison, classification, specification, design of results, modeling); empirical (questionnaire, diagnosis, observation); statistical (mathematical and statistical processing of the results, monitoring, examination).

The main provisions:

1. Literacy is the level of knowledge and skills in a certain area, as well as the ability to apply them in practice. A person who is able to correctly and systematically express his thoughts, speak and write in accordance with the stylistic norm of the Kazakh language should not only find the necessary information, but also navigate the world of infinite information, be able to choose, analyze and generalize from the acquired knowledge what he needs, apply in real life and in practice. The clarified meaning of "literacy" as a psychological and pedagogical concept and its structure are the basis for creating a scientific and methodological basis for the organization of the educational process.

A future primary school teacher should have not only knowledge, skills and competencies in the theoretical foundations of mathematics, but also be a methodologist, an instructor of students, a manager of the educational process who has mastered methodological techniques aimed at organizing and managing the teaching of mathematics to younger schoolchildren. The essence of the concept of

"methodological and mathematical literacy" is the ability of the student to apply mathematical and methodological knowledge and skills in his real life practice. The development of methodological and mathematical literacy of the future primary school teachers *is an innovative trajectory for improving the preparation of students for the application of methodological, psychological and pedagogical knowledge, theoretical foundations of mathematics and knowledge obtained in methodological disciplines in everyday educational, research and graduation (diploma) work, during pedagogical practice and in real life.*

2. The primary school teachers' development of methodological and mathematical literacy will be provided taking into account the following pedagogical opportunities: 1) to have a higher education in the theoretical foundations of primary school; 2) to know the basics of mathematical theories that primary school students should have; 3) to have methodology for the formation of knowledge, skills and abilities of future teachers for students; 4) to know and be able to put into practice the methodology of teaching algorithmic materials considered in elementary school.

3. The structural and content model of the future primary school teachers' development of methodological and mathematical literacy is a structure in which the theoretical and methodological foundations for achieving the final result are determined; the components and indicators of literacy development are determined, a system of exercises concerning the used algorithm for training specialists and aimed at the development of methodological and mathematical literacy of the future specialist is developed, the levels of "literacy" are determined. The model can serve as a scientifically based methodological guide that will guide future primary school teachers in the development of their methodological and mathematical literacy, in updating the actions of higher pedagogical educational institutions in solving theoretical and practical problems.

4. It is implemented with the introduction of tasks for independent work into the pedagogical process of the university in the textbook "Fundamentals of updated mathematical education of younger schoolchildren" and the educational and methodological complex "Methodology of learning algorithms".

Description of the main results of the research:

1. The definitions of the concepts of "literacy", "mathematical literacy", "methodological literacy", "methodological and mathematical literacy" and the concepts of "methodological and mathematical literacy of future primary school teachers" have been clarified.

2. The possibilities of developing methodological and mathematical literacy of future primary school teachers are determined.

3. A structural and content model of the development of methodological and mathematical literacy of future primary school teachers has been developed.

4. A methodological system for the development of methodological and mathematical literacy of future primary school teachers has been developed, an educational and methodological complex "Methods of teaching algorithms" and a textbook "Fundamentals of updated mathematical education of younger schoolchildren" aimed at the development of methodological and mathematical

literacy of future primary school teachers have been developed and tested in experimental work, scientifically based recommendations have been prepared.

The degree of novelty of the obtained results and conclusions

The degree of novelty of each scientific result and conclusion formulated in the research work is as follows:

The 1st result is new. During the analysis of psychological-pedagogical and scientific-methodical works were analyzed key categorical points, the concepts of "literacy", "methodological literacy", "mathematical literacy", "methodological and mathematical literacy" and the concept of "development of methodological and mathematical literacy of future primary school teachers" were clarified.

The 2nd result is new. For the first time, an attempt has been made to substantiate the pedagogical possibilities of the development of methodological and mathematical literacy of primary school teachers, such as: 1) The presence of high knowledge of the theoretical foundations of mathematics; 2) knowledge of the fundamentals of mathematical theories that primary school students should have; 3) the development of teaching methods by future teachers, the formation of knowledge, skills and abilities of students; 4) knowledge and ability to apply in practice the teaching methodology of algorithmic material considered in elementary school.

The 3rd result is new. In the course of the research was developed a structural and content model, in the components of criteria and indicators of the future primary school teachers' development of methodological and mathematical literacy of and its high, medium, and low levels were theoretically determined.

The 4th result is new. The system of development of methodological and mathematical literacy of future primary school teachers is presented for the first time (the educational and methodological complex "Methodology of teaching algorithms", the textbook "Fundamentals of updated mathematical education of younger schoolchildren").

Compliance with the directions of science development or state programs:

Literacy issues were raised in the Law of the Republic of Kazakhstan "On Education", in the "State Program for the Development of Education and Science of the Republic of Kazakhstan for 2020-2025 y.s.", in the "National Action Plan for the development of functional literacy of schoolchildren for 2012-2016 y.s." and in the messages of the President of the country K.K.Tokayev, and it can be noted that there is a full possibility of the problem of the development of functional literacy. both students and future specialists.

"The use of arithmetic algorithms" for "Mastering oral and written computational algorithms" is one the standard curriculum for the updated content of education in the «State general standard of education». This should be known and mastered by future primary school teachers themselves, they should be highly qualified specialists who know the methodology of teaching algorithmic mathematical material. Therefore, the search for theoretical and practical solutions for the development of methodological and mathematical literacy of future primary school teachers demonstrates a close connection with state programs for the development of education and science in the Republic of Kazakhstan.

Description of the doctoral student's contribution to the preparation of each publication:

During the preparation of publications, a theoretical analysis of the literature was carried out, the publications also present an analysis of the conducted experimental research. On the topic of the dissertation research published 8 articles, 1 textbook, 1 teaching aid for university students, 10 textbooks and teaching aids for primary school students have been published according to the content of the research work.

The doctoral study student presents an analysis of theoretical material about exercises of various content and orientation, including mathematical, as well as aimed at developing mathematical literacy of the future teacher in the article «Algorithmic methodological and mathematical literacy of the future primary education teacher: Perspective of learning technology» which is included in the Scopus database (World Journal on Educational Technology: Current Issues. Volume 13, Issue 4, (2021), – 758-774. A.Zhumabayeva, M. Romanova, N. Nygymanova, R.Bazarbekova, M.Nizamova). The results of experimental work on determining the dynamics of the development of algorithmic methodological and mathematical literacy of a future teacher with the help of such exercises are presented. The contribution (share) of a doctoral student in writing an article is 80 percentage.

In the article «Болашақ маманның әдістемелік-математикалық сауаттылығын дамытудағы алгоритмнің рөлі» («Қазақстанның ғылымы мен өмірі», Алматы, 2019, №12/2. – 86-91 с) was made an overview of the interpretation of the concept of "algorithm" and the role of the algorithm in the process of teaching mathematics with supporting examples. The contribution of a doctoral student in writing an article is 100 percentage.

In the article «Болашақ бастауыш сынып мұғалімдерінің алгоритмдік сауаттылығын дамыту жолдары». Абай атындағы ҚазҰПУ Хабаршысы, «Физика-математика ғылымдары» сериясы №1 (69), Алматы, 2020. – 285-291 беттер (Қосалқы автор: Жұмабаева Ә.Е., 70%) were analyzed the algorithms that considering implicitly in the course of primary school mathematics, the problems of their use in teaching practice by future primary school teachers. The contribution of a doctoral student in writing an article is 90 percentage.

In the article «Болашақ бастауыш сынып мұғалімдерінің әдістемелік-математикалық сауаттылығын дамытудың әдіснамалық тұғырлары» – (Қазақстанның ғылымы мен өмірі», Алматы, 2020, №12/2. – 112-119 беттер. (Қосалқы автор: Жұмабаева Ә.Е. was presented an analysis of theoretical material by the doctoral student on the systemic, activity, anthropological, axiological and competence approaches in general and the essential features of each of them. The share of a doctoral student in writing an article is 90%.

In the article “Болашақ бастауыш сынып мұғалімдерінің әдістемелік-математикалық сауаттылығын дамытудағы жаттығулардың рөлі» (Абай атындағы ҚазҰПУ-ң Хабаршысы. – «Педагогика ғылымдары» сериясы – Алматы, №4, 2021. – 113-126 беттер (Қосалқы автор: Жұмабаева Ә.Е.) was presented the essence of the concept of "exercise", concrete examples of practice-

oriented and modeling types of exercises are given, the results of experimental work. The share of a doctoral student in writing an article is 90 percentages.

The article «Алгоритм және бастауыш сынып мұғалімдерінің алгоритмдік сауаттылығын дамытудың кейбір мәселелері» (Materials of the XV International scientific and practical Conference. Modern scientific potential. – Sheffield, s Yorkshire, England, s1 4lr, 2019, February 28 – March 7, 2019, p.40-47) was written by a doctoral student alone, the contribution is 100 percentage.

In the article «Болашақ бастауыш сынып мұғалімдерінің әдістемелік-математикалық сауаттылығын дамытудың құрылымдық-мазмұндық сипаты» (Халықаралық ғылыми-практикалық конференция «Көшбасшылық және менеджмент: теория мен практиканың қазіргі даму тенденциялары» – Абай атындағы ҚазҰПУ, Алматы, 26 сәуір, 2019. – 295-300 беттер) by the doctoral student was analyzed the components of methodological and mathematical literacy of future primary school teachers: methodological, pedagogical, psychological, theoretical, methodological and practical literacy. The article was written by a doctoral student alone, the share is 100 percentage.

In the textbook «Основы обновленного математического образования младших школьников» (Алматы, 2021. – 215 с. Соавторы: Кдырбаева А. А., Оспанов Т. К.) for university students tasks for independent work of students in the "Professional and business block" are based on algorithmic material. The section was written by a doctoral student, his contribution is 80 percentage.

Educational and methodical manual «Алгоритмдерді оқыту әдістемесі» (Алматы, 2022. – 72 С, соавтор: Жумабаева А. Е.) (70%) for the students of higher educational institutions of the speciality primary education fully reflected the content of the doctoral student's dissertation and corresponds to the obtained research results. The contribution of a doctoral student in writing an article is 90 percentage.