МАТЕМАТИКАНЫ ОҚЫТУ ӘДІСТЕМЕСІ

МЕТОДИКА ПРЕПОДАВАНИЯ МАТЕМАТИКИ

METHODS OF TEACHING MATHEMATICS

IRSTI 14.35.09

10.51889/2959-5894.2024.87.3.006

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TRAINING FUTURE TEACHERS OF MATHEMATICS TO DEVELOP FINANCIAL LITERACY OF SCHOOL STUDENTS

Abstract

Mathematics is one of the important subjects that allows you to form and develop financial literacy of students through the content and tools of training. The article discusses the issues of improving the professional and methodological training of future mathematics teachers by introducing a special course in the content of the educational program for the formation of financial literacy of students while studying the school course of mathematics. Also, the article presents the content of the course "Fundamentals of financial literacy and their mathematical solutions", necessary for the formation of financial literacy of students, methodology for solving problems of financial and economic content was proposed and specific examples were given. The purpose of the study is to identify the methodological basis for improving the professional training of future mathematics teachers to develop financial literacy of school students. The objectives of the study are to study the condition of training future teachers of mathematics to develop financial literacy of school students, to compile substantive and methodological recommendations for the course "Fundamentals of financial literacy and their mathematical solutions". The effectiveness of the methodological recommendations of the research work is confirmed experimentally by introducing them into the process of teaching mathematics in general education schools in Almaty. The significance of the study is that the result of the study contributes to the integration of the content of the mathematics course with financial knowledge by introducing a special course into the educational program of pedagogical universities, the formation of financial literacy of school students using financial and economic content tasks.

Keywords: general education school, higher education institutions, financial literacy, mathematics, educational program, financial and economic content tasks.

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МЕКТЕП ОҚУШЫЛАРЫНЫҢ ҚАРЖЫЛЫҚ САУАТТЫЛЫҒЫН ҚАЛЫПТАСТЫРУҒА БОЛАШАҚ МАТЕМАТИКА МҰҒАЛІМДЕРІН ДАЙЫНДАУ

Аңдатпа

Математика – оқыту мазмұны мен құралдары арқылы оқушылардың қаржылық сауаттылығын қалыптастыру мен дамытуға мүмкіндік беретін маңызды пән. Мақалада мектеп математика курсын оқыту процесінде оқушылардың қаржылық сауаттылығын қалыптастыру үшін болашақ математика мұғалімдеріне арналған білім беру бағдарламасының мазмұнына арнайы курсты енгізу арқылы кәсіби-әдістемелік дайындығын жетілдіру мәселесі қарастырылған. Мақалада болашақ математика мұғалімдерінің оқушылардың қаржылық сауаттылығын қалыптастыруға қажетті «Қаржылық сауаттылық негіздері және олардың математикалық шешімдері» курсының мазмұны айқындалып, қаржылық-экономикалық мазмұнды есептерді шығарудың әдістемесі ұсынылады, нақты мысалдармен келтірілген. Зерттеу мақсаты - мектеп оқушыларының қаржылық сауаттылығын қалыптастыруға

болашақ математика мұғалімдерінің кәсіби дайындығын жетілдірудің әдістемелік негіздерін анықтау. Зерттеу міндеттері - жоғары оқу орындарында болашақ математика мұғалімдерінің оқушылардың қаржылық сауаттылығын қалыптастыруға дайындығын зерделеу, «Қаржылық сауаттылық негіздері және олардың математикалық шешімдері» курсы бойынша мазмұндық пен әдістемелік ұсынымдар жасау. Зерттеу жұмысындағы әдістемелік ұсынымдардың тиімділігі Алматы қаласының жалпы білім беретін мектептерінде математиканы оқу процесіне енгізіліп, эксперимент жүзінде дәлелденген. Зерттеудің маңыздылығы – педагогикалық жоғары оқу орындарында математика мұғалімдерін дайындауда арнайы курсты ұйымдастыру арқылы математиканы қаржылық біліммен кіріктіре оқытуға, қаржылық-экономикалық мазмұнды есептер арқылы оқушылардың қаржылық сауаттылығын қалыптастыруға ықпал етеді.

Түйін сөздер: жалпы білім беретін мектеп, жоғары оқу орындары, қаржылық сауаттылық, математика, оқу жоспары, қаржылық-экономикалық мазмұнды есептер.

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ПОДГОТОВКА БУДУЩИХ УЧИТЕЛЕЙ МАТЕМАТИКИ К ФОРМИРОВАНИЮ ФИНАНСОВОЙ ГРАМОТНОСТИ УЧАЩИХСЯ ШКОЛ

Аннотация

Математика – один из важных предметов, который позволяет формировать и развивать финансовую грамотность учащихся, посредством содержания и инструментов обучения. В статье рассматриваются вопросы совершенствования профессионально-методической подготовки будущих учителей математики, путем введения специального курса в учебные планы и тематики для ознокомления знаний по финансовой сфере и применения методических умений и навыков в педагогической деятельности в школе. Представленный курс «Основы финансовой грамотности и их математические решения» обеспечивает подготовку выпускников педвуза и предложена методика решения задач финансово-экономического содержания, приведены конкретные примеры. Цель исследования – выявить методическую основу совершенствования профессиональной подготовки будущих учителей математики для формирования финансовой грамотности учащихся школ. Задачи исследования - изучить состояние подготовки будущих учителей математики к формированию финансовой грамотности учащихся школ, составить содержательные и методические рекомендации по курсу «Основы финансовой грамотности и их математические решения». Эффективность методических рекомендаций научно-исследовательской работы подтверждена экспериментально путем внедрения их в процесс обучения математике в общеобразовательных школах г.Алматы. Значимость исследования – результат исследования способствует интеграции содержания курса математики с финансовыми знаниями путем введения специального курса в учебный план, реализации межпредметной связи на основе задач финансово-экономического характера.

Ключевые слова: общеобразовательная школа, высшие учебные заведения, финансовая грамотность, математика, учебный план, задачи финансово-экономического содержания.

Main provisions

The main idea of the study is that the methodological basis for improving the professional training of future mathematics teachers in connection with increasing the financial knowledge of students were determined, the content of the special course curriculum, methodological guidelines and financial and economic content tasks were developed. Conclusions and results of the research - a methodological system for preparing mathematics teachers for the formation of students' financial literacy in higher educational institutions (aims, content, methods and forms, tools of the study) was presented, methodological guidelines for increasing financial literacy and a system of financial and economic content tasks were introduced into the educational process, and the results processed by mathematical methods.

Introduction

Currently, the issue of increasing financial literacy in the context of financial education for the population and students of our country is being discussed at the government level. In this regard, the

President Kassym-Jomart Tokayev in his address to the people of Kazakhstan charged to expand the "Debtless Society" project to increase financial literacy of the population to master debt and credit information [1]. Our republic has a concept for the development of financial literacy for 2020-2024, which states that it is necessary to prepare a curriculum and digital resources to improve the education of students at all levels of education and tools to implement this objective is indicated [2]. Also, in the concept of education development for 2023-2029, preparation for future activities by integrating financial knowledge into the curriculum of students [3]. Also, at the meetings of the Government, teaching of the subject of financial literacy was given as a proposal for the curriculum in educational organizations [4].

Students can be given financial knowledge during the lesson. In this context, state education standards and programs, principles, normative legal acts allow for integrated teaching of financial literacy with academic subjects, including mathematics. After all, mathematics is an important subject in the development of all types of functional literacy, including not only mathematical literacy, but also financial literacy and economic thinking of students.

However, in the course of teaching the subjects of the curriculum, the skills of teaching graduates to develop and produce interdisciplinary economic reports intended to provide financial knowledge to students and young people in their pedagogical activities and to form their literacy are insufficient. Accordingly, it will be necessary to prepare educational resources (collection of reports, manuals, tools) to improve subject and teaching knowledge and skills.

Here, domestic scientists - A.E. Abylkassymova, A.K. Kagazbaeva et al. The teacher is involved in the development of the methodology of mathematicians and has published many articles and textbooks [5, 6]. If we consider the publications, they are training young specialists-teachers, not enough research was conducted on the issue of teaching them to form financial literacy of schoolchildren and methodological support, and often a lot of attention is paid to the methodology of teaching the subject.

The content of subjects in the "6B01501-Mathematics" educational program for training future mathematics teachers in higher educational institutions includes the subject "Economics and entrepreneurship research methods" [7]. In learning the subject, students do not develop a methodology for teaching students, but learn only the basic financial system. Therefore, it is necessary to introduce a special course to upgrade the methods and content of the subject competences of future mathematics teachers and improve the financial literacy of students, and focus on creating its methodological complex. In order to solve these problems, it is necessary to pay special attention to the work plan and lesson content of higher educational institutions that train young specialist mathematics teachers and introduce innovation.

A young graduate of an educational institution uses the acquired mathematical knowledge and skills in the educational process to form the financial literacy of students in his pedagogical work. Therefore, it will be necessary to control the methodological aspects of training in order to prepare the graduate in advance in pedagogical higher educational institutions and provide it with educational and methodological support for the formation of financial literacy of schoolchildren determines the relevance of the research work.

Research methodology

Financial literacy is a knowledge and skill necessary for social activities and lifestyle in human life. Therefore, a person should have financial literacy in order to be able to solve problems related to finances that arise in any field of activity. Financial literacy is a person's ability to earn money on his own from a young age and show how to allocate and spend it effectively. Experts of the Organization for Economic Cooperation and Development (OECD) say: "The progress of the financial sector in society, the political and economic conditions in each country require a person to be competent in financial education". In this regard, in 2003, on the basis of the development of the principles of financial literacy, OECD started a project to propose ways to improve financial education and literacy standards [8].

As for the definition of the concept of "financial literacy", formulation is given in the works of foreign and domestic scientists - A. Lusardi, C. Sawatzki, M. Noctor, S. Stoney, R. Stradling, O.Y. Lazebnikova, G. S. Kovaleva, Z. S. Yerkisheva and others (Table 1).

Table 1. Definitions of the concept of "financial literacy".

No	*Authors*	*Description*
1	*A. Lusardi*	*the ability of a person to use his funds correctly, manage them and make effective decisions [9].*
2	*S. Sawatzki*	*the ability to acquire information, knowledge and skills system that allows to improve the social situation of a person, to achieve his own financial situation, to make the right decision [10].*
3	*M. Noctor, S. Stoney, R. Stradling*	*ability to manage money and make rational decisions based on it [11].*
4	*O. Y. Lazebnikova*	*the ability to acquire knowledge and skills to achieve financial goals in everyday life [12].*
5	*G. Kovaleva*	*the ability to achieve personal financial success through study, analysis and management, to be financially successful [13].*
6	*Organization for Economic Cooperation and Development*	*knowing, understanding and applying terms and concepts in the field of finance, determining effective solutions to problems, knowledge and skills necessary to improve the financial situation in life, access to financial activities in family and community affairs [14, 15].*
7	*Z.S. Yerkisheva*	*the ability to master financial competences in daily life needs an informed and digital society, improving certain financial knowledge and skills accumulated in improving living conditions of a person [16].*

Based on the study of the definitions in this table, we defined the following concepts for the concept of "financial literacy", that is, financial literacy is a type of knowledge and skill formed on the basis of financial knowledge and the ability to use it; appropriate financial behavior, education; established financial experience. Currently, due to the fact that the formation of these concepts is relevant and one of the main factors necessary for the self-realization of a person in society, there is a need to prepare students for it from school age and it is one of the main requirements of modern education. In PISA work, one of the international studies that evaluates the education of students, we noticed that students of developed countries have a high level of financial literacy in their educational achievements. In this study, students solve financial problems encountered in everyday life, personal and family life, perform tasks and calculations, and understand and apply the necessary concepts, terms, and practices. Tasks aimed at applying financial knowledge in the PISA study can be divided into two groups: 1) tasks on "financial arithmetic": spending, depositing and receiving money, the amount of expenses and remaining funds, the result of currency exchange; 2) actions performed due to a certain situation [14, 15]. There are works of foreign and domestic scientists dedicated to the formation of financial literacy of students. Let's focus on the methodological features proposed by the scientists-methodologists. Y.A. Sedova imparted financial knowledge in an interdisciplinary relationship with mathematics and expressed an opinion on forming the literacy of young students with calculations [17]. In his work T.A. Almazova says to form students' literacy with financial calculations in mathematics education [18].

A.E. Abylkassymova, Z.S. Yerkisheva, Z.N. Turganbayeva proposed methods of solving economic problems on the basis of stochastic knowledge, which contribute to the formation of financial literacy of students during the teaching of mathematics, approaches to the development of thinking ability [19]. From the research works, we see that mathematics is a subject that forms financial literacy in interdisciplinary connection with natural sciences and economic subjects in terms of theory and practice, and uses mathematical methods to achieve certain goals. Of course, school mathematics teachers have research work aimed at forming the financial literacy of their students, but

the graduates of pedagogical higher educational institutions should also be armed with methodological preparation, educational content, teaching methods and tools to form the literacy of students in their future work. Academician A.E. Abilkasymova says that school mathematicians should be deeply educated and use the methodology they have mastered at the educational institution [20]. There are many publications created by scientists for the systematic training of young specialist teachers-mathematicians - A.G. Mordkovich, I.A. Novik, N.L. Stefanova, O.A. Ivanov, Y.V. Silayev, M.A. Skiba and etc., from domestic scientists - works of A.E. Abylkassymova, A.K. Kagazbayeva, S.Y. Altynbekov (Table 2).

Table 2. Research on the training of future mathematics teachers

No	*The author*	*Description of work*
1	*A.G. Mordkovich*	*The concept of training future mathematics teachers in a professional-pedagogical direction was created and it was implemented on the basis of the principles of fundamentality, continuity, comprehensiveness, and continuity [21].*
2	*I. A. Novik*	*By forming the fundamental and methodical culture of future mathematics teachers, he created a methodical system of providing knowledge, skills, and abilities. In higher educational institutions, he studied the methodological foundations of methodological training through the mathematical culture of the future teacher [22].*
3	*N. L. Stefanova*	*He gave the concept of improving the professional knowledge and training of future mathematics teachers based on methodological principles. Defines the theory and practice of teaching mathematics at school and offers special methods of teaching in practice. The methodical training of teachers in higher educational institutions was implemented in the special education system and it is referred to as the methodical system of training of mathematics teachers [23].*
4	*A.E. Abylkassymova*	*Paying attention to the development of the activity and original cognitive interest and activities of the mathematics teacher at the university, he offers practical ways to provide methodological training, provides a system for organizing the cognitive activity of future teachers, and organizes educational and research work. The preparation of mathematics teacher-students is the process of mastering the basic knowledge of school mathematics, the methodological knowledge and skills necessary for teaching it to students, and preparing it for practical implementation [5, p.12].*
5	*A.K. Kagazbayeva*	*He determined the methodology, provides the principles of methodological preparation of mathematics teachers-students for their pedagogical work in higher educational institutions and the rules of their implementation, educational content and subjects to ensure the system.* *He talks about the methodological preparation of students in higher educational institutions is a system organized for teaching students methodological knowledge, theory and practical methods of implementation of theory and practice in general education schools [6, p.13].*
6	*S.Y. Altynbekov*	*Bolashak has created the methodological basis for preparing the future mathematics teacher to teach students to solve Olympiad problems, and thus offers a methodology for the formation of students' research skills. A special course "Olympic problem solving in mathematics" was introduced into the educational process [24].*

Analysing the research works in table 2 and others, the problems of theoretical justification of the system of professional-methodical training of future mathematics teachers were reviewed and resolved; It was determined that the content of methodological preparation of mathematics teachers in higher pedagogical educational institutions is different. If we look at the works, there are few works of graduates-mathematics teachers to form students' financial literacy.

Currently, the educational program "6B01501-Mathematics (IP)" for training mathematics teachers in higher educational institutions is developed jointly with other universities of Kazakhstan

under the supervision of foreign experts within the framework of the project "Strengthening the educational potential of teachers" financed by the World Bank, and in the 2023-2024 academic year KazNPU named after Abay it was introduced in the pilot mode and in the 2024-2025 academic year it was introduced to the pedagogical universities. The cycle of basic and formative subjects in the educational program "6B01501-Mathematics (IP)" includes elective courses that provide in-depth teaching of school mathematics, basic subjects, educational-methodical subjects, which provide training for a mathematics teacher. This program improves the continuity of the mathematics course at school with the teaching content. In our work, we recommend giving the program of the training course to the work plan in order to prepare for the formation of financial literacy of students in the future work of young professional teachers.

Research results

In our research work, in order to adapt future teachers of mathematics to the formation of financial literacy of students, we propose to introduce the course "Fundamentals of financial literacy and their mathematical solutions" in the educational program "6B01501-Mathematics" with 4 credits in 3 courses. This course is especially relevant due to the lack of life experience of school students in the market economy. Because of this, many families are not only unable to manage their income and savings rationally, but also fail to teach their children about financial behavior in a practical way.

In the course of training, financial knowledge and its connection with mathematics, financial and economic content calculations and methodological bases of training for their production, and the use of mathematical methods are considered. Based on dissertation research, we present the methodological system of teaching the course "Fundamentals of financial literacy and their mathematical solutions" to future mathematics teachers-students (figure 1).

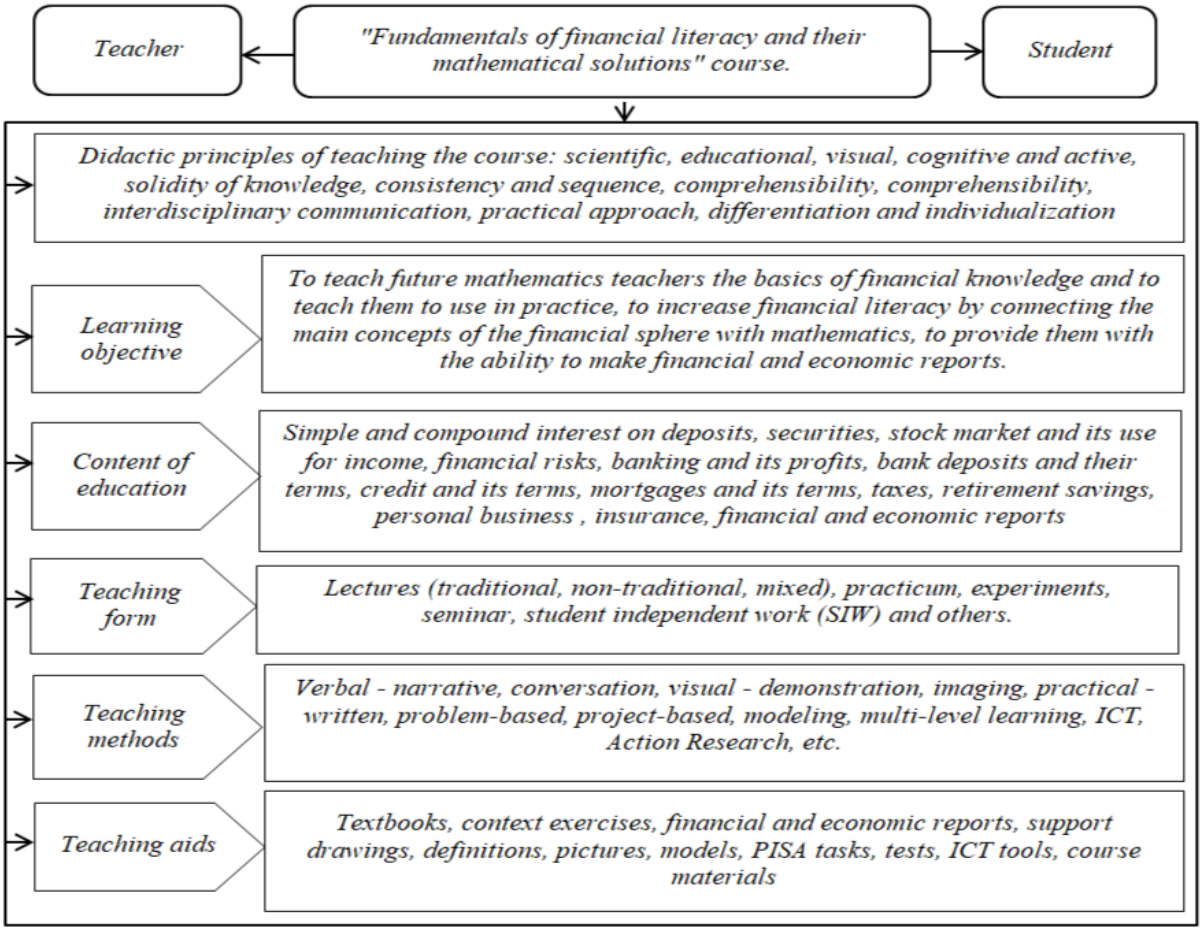

Figure 1. Methodological system of teaching the course "Fundamentals of financial literacy and their mathematical solutions"

Five components (purpose of the course, teaching content, methods, form, tool) are presented in the proposed methodological system. In order to form financial literacy in mathematics, financial and economic tasks are the main teaching tools. Financial and economic tasks contain terms of social importance on banking, trade, consumer, mortgage, deposit, life and property insurance issues and produced by mathematical methods. Compilation of such problems and use in the learning process depends on the teacher's knowledge and methodological skills. Among the teaching tools, it is important to teach students to produce contextual reports in research that externally assess the knowledge of students. Now let's look at financial and economic reports according to the topic that we give to students in the seminar practical classes of the course we are offering.

Exercise 1. "Export".

Figure 2 below shows information on the export volume of Kazakhstan.

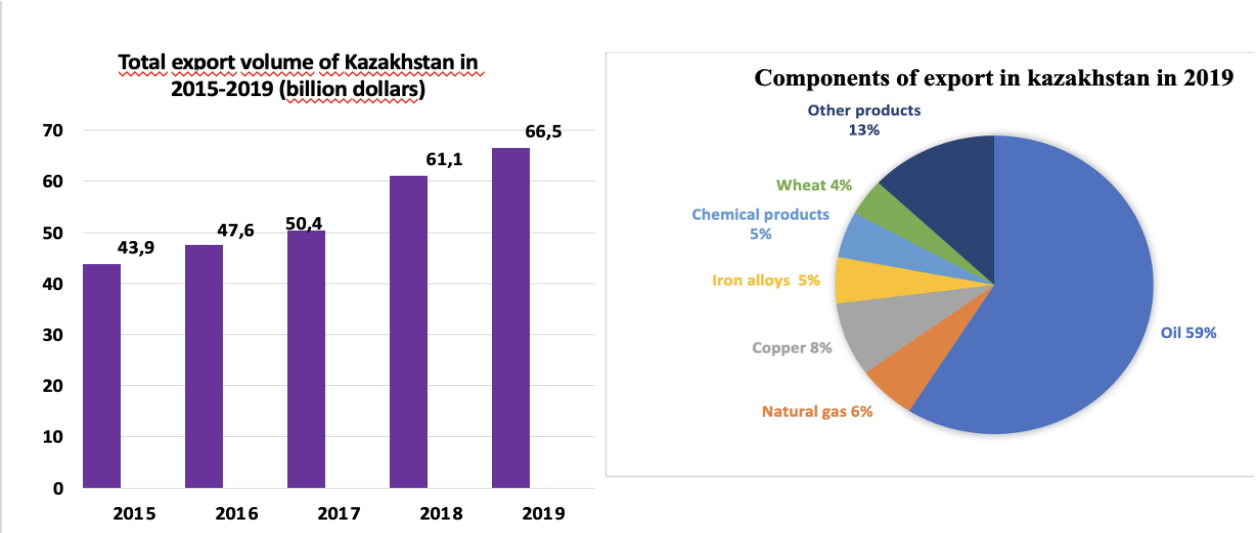

Figure 2. Information on the export volume of Kazakhstan

Tasks:

1) What was the total value of exports in Kazakhstan in 2017 (in billions of dollars)?

Answer: As we can see from the diagram, the figure 50.4 shows that 50,400,000,000 dollars.

2) How much income did the export of natural gas from Kazakhstan bring in 2019?

A) 3.2 bln. dollar. B) 3.8 billion. dollar. C) 3.4 billion. dollar.

D) 4.0 billion. dollar. E) 3.6 billion. dollar.

Answer: In 2019, the export of natural gas amounted to 6 percent:

$$66\,500\,000\,000 \cdot \frac{6\%}{100\%} = 3\,990\,000\,000 \approx 4{,}0 \text{ млрд.}$$

Export of fruit juice brought 4 bln. dollar income.

Exercise 2. "Currency exchange rate".

Anton from Russia prepared for a 3-month trip to Kazakhstan under the student exchange program. He needed to exchange some Russian Rubles (RUB) into Kazakhstani Tenge (KZT).

Tasks:

1) Anton found out that exchange rate between the Russian ruble and the Kazakhstani tenge as follows: 1 RUB = 5.3 KZT. Anton exchanged 180 000 Russian rubles to Kazakhstani tenge according to the this exchange rate. How much Kazakhstani tenge did Anton get?

Answer :$180\,000 \cdot 5{,}3 = 954\,000$. Anton received 954000 Kazakhstani Tenge.

2) When Anton returned to Russia after 3 months, he had 62,000 KZT left. He exchanged them for Russian rubles, but at the modified rate: 1 RUB = 5.0 KZT. How many Russian rubles did Anton receive?

Solution :$62\,000 : 5 = 12\,400$. Anton received 12 400 Russian rubles.

Exercise 3. "National musical instruments".

Figure 3 below shows information about the goods and their prices in the "Kazakh Melody" store.

Tasks:

1) Saken added the prices of dombra, kobyz and jetigen in the calculator. As a result, it was 213 600 tenge (Figure 4).

Saken's answer is incorrect. Find out what he did wrong.

A) Saken adds the same price twice.

B) Saken forgot one while connecting.

C) Saken forgot the last digit of a number.

D) Saken performed one column addition with subtraction.

Answer : Saken forgot to write the last digit "0" when he wrote the price of jetigen. As a result, the result of 92 000 + 106 000 + 15 600 = 213 600 was obtained. Option C is correct.

Figure 3. Prices of goods in the "Kazakh Melody" store

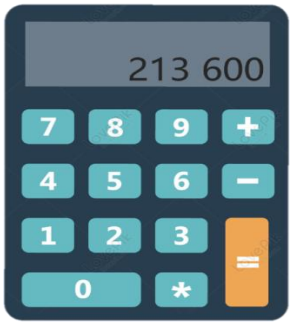

Figure 4. Calculator

2) In the "Kazakh Music" store, the seller offered a discount: if you buy 2 or more instruments, there is a 20% discount on finance. Since Talgat has 200,000 tenge, what kind of instrument will he buy? Please select «Yes» or «No» from the options below (Table 3).

Table 3. Discounts in the "Kazakh Music" store

Goods	*Can Talgat buy these things for 200 000 tenge?*
1. Drum and kobyz	*Yes / No*
2. Drum and jetigen	*Yes / No*
3. All 3 instruments	*Yes / No*

Answer : 1) $92000 + 106000 = 198000 \Rightarrow 198000 \cdot \frac{80\%}{100\%} = 158400$ (Yes);

2) $92000 + 156000 = 248000 \Rightarrow 248000 \cdot \frac{80\%}{100\%} = 198400$ (Yes);

3) $92000 + 106000 + 156000 = 354000 \Rightarrow 354000 \cdot \frac{80\%}{100\%} = 283200$(No).

Exercise 4. "Holiday home".

Asylbek looked at various holiday homes and chose one. It was necessary to pay a fee to visit during the holidays (Table 4).

Table 4. Housing situation

Number of rooms	*1 x living room and kitchen1 x bedroom, 1 x bathroom*	*Price: 27 000 000 tenge* 
District	*60 (m ^{2})*	
Parking lot	*There is*	
Time to city center	*10 minute*	
Distance to the beach	*350 meter*	
Average length of stay for guests over the past 10 years	*315 days per year*	

Task: Asylbek determined the price of a holiday home using the conditions in table 5.

Table 5. Housing cost

1 m ^{2} price	Basic price	400 000 tenge per 1 ^{m2}			
Additional price criteria	Time to city center	more than 15 minute : + 500 000tg	5 – 15 minutes : +1 000 000 t g	less than 5 minute : +200 000 tg	
	Distance to the beach	more than 2 km: +0 tg	1 - 2 km: +500 000 tenge	0.5 - 1 km: +1 000 000 tg	less than 0.5 km: +1 500 000 tenge
	Parking lot	Not provided: + 0 tg	Provided: +1 000 000 tg		

If the expert's price is higher than the seller's price, it will be very profitable for Asylbek. Find out if your vacation home is worth the price with our expert evaluation criteria.

Answer: The price determined by the expert: basic price: $60 \cdot 400000 = 24\,000\,000$tg; additional price for the time to the center: 1 000 000 tenge; price according to the distance to the beach: 1 500 000 tenge; additional price for parking: 1 000 000 tenge; total price: 27 500 000 tenge. Therefore, the initial offer of 27 000 000 tenge by the seller of the housing was profitable for Asylbek.

Discussion

A pedagogical experiment was conducted in the specialized lyceum No. 178 of Almaty city in order to substantiate the effect of educational materials on the financial knowledge and literacy formation of students according to the methodological system of the proposed course.

The purpose of the conducted pedagogical practice is to prove the effectiveness of the method of forming students' financial literacy by producing financial and economic tasks.

The pedagogical experiment was implemented in the following stages:

1) determination period (3 quarter of the 2023-2024 academic year);

2) teaching period (3 quarter of the 2023-2024 academic year);

3) teaching and summation period (4 quarters of the academic year 2023-2024).

The results during the experiment were obtained through formative and summative evaluations using a 20-point system. The control group included 10 "A" and 10 "B" students, and the experimental group included 10 "B" and 10 "G" students, and their academic achievements at the beginning and end of the experiment are shown in Table 6.

Table 6. Learning achievements at the beginning and end of the pedagogical experiment

	Experimental group		Control group	
No	At the beginning of the experiment	At the end of the experiment	At the beginning of the experiment	At the end of the experiment
$\sum$	**624**	**872**	**591**	**633**
$\bar{x}$	1 1 , 556	1 6 , 463	11,596	1 1 , 981
δ	11,155	4,178	8,755	11,902
$\sqrt{\delta}$	3,340	2,044	2,959	3,450

During the defining phase of the pedagogical experiment, group evaluations were conducted, and statistical analysis of their educational achievements was conducted. The results obtained by Student's t-criteria did not show any difference and can be seen in Table 7.

Table 7. Students' results at the beginning of the experiment

Scale	Experimental group	Control too	Student's t-test	p -value	Conclusion
Results at the beginning of the experiment	$\bar{x}$ =1 1 . 556 $\sqrt{\delta}$ =±3. 340	$\bar{x}$ =1 1 . 596 $\sqrt{\delta}$ =± 2.959	0 .01	0. 993	" Primary results " scale between the two groups is not significant. (where t_{crit} , =1 . 984).

During the teaching period of the experiment, the proposed methodical recommendations and the production of financial and economic tasks were used in the mathematics class.

At the conclusion of the experiment, a summary assessment was conducted to determine the educational achievements of the participant - experimental and control groups, the results were obtained and comparative analyzes were made (Tables 8-9).

Table 8. Results of the control group at the beginning and end of the pedagogical experiment

Scale	Before the experiment	Post-experiment	Student's t-criteria	p -value	Conclusion
Control group	$\bar{x}$ =1 1 . 596 $\sqrt{\delta}$ =± 2 . 959	$\bar{x}$ =1 1 . 981 $\sqrt{\delta}$ =± 3 . 410	1 , 605	0.115	Differences between the results at the beginning and the end of the experiment were determined ($t_{control} < t_{crit}$, where t_{crit} = 2.009, $p<0.115$).

Table 9. Results of the experimental group at the beginning and end of the pedagogical experiment

Scale	Before the experiment	Post-experiment	Student's t-criteria	p -value	Conclusion
Experimental group	$\bar{x}$ =1 1 . 556 $\sqrt{\delta}$ =±3. 340	$\bar{x}$ =1 6 . 463 $\sqrt{\delta}$ =±2. 044	19 , 872	0 .000	Significant differences were found between the results at the beginning and the end of the experiment ($t_{control} > t_{crit}$, where t_{crit} = 2.007, $p<0.001$).

At the end of the pedagogical experiment, it was found that the educational level of the students in the experimental group who made financial and economic calculations during the teaching of mathematics (average: 16.463; standard deviation: 2.044) was 27.22% higher than the students in the

control group who were taught with traditional educational materials (average: 11.981; standard deviation: 3.410).

Changes in the level of formation of students' financial literacy are shown in Table 10 below and we present it visually with a diagram (Figure 5).

Table 10. Levels of formation of students' financial literacy

	Experimental group		Control group	
	At the beginning of the experiment	At the end of the experiment	At the beginning of the experiment	At the end of the experiment
Education level	57.5 %	8 2.2 %	59.9 %	62.4 %

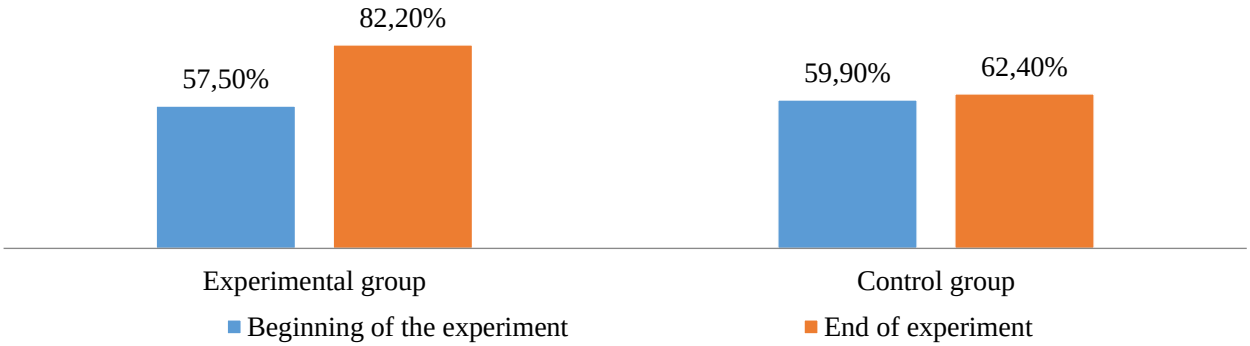

Figure 5. Levels of formation of students' financial literacy

At the end of the pedagogical experiment, the level of students' financial literacy increased by 24.7% in the experimental group and 2.5% in the control group. It proves the effectiveness of the proposed methodological recommendations and the system of special problems and shows that it allows students to form their financial literacy during teaching of mathematics. We believe that the method of organizing mathematics lessons for students to make financial and economic calculations will help to form their financial literacy.

Conclusion

So, in order to prepare graduates with regular training in higher educational institutions that train teacher-mathematicians:

- the teaching content of subjects and courses in the curricula should be revised in accordance with educational standards to meet the changes and demands of the market in society;
- it is necessary to systematize the course and educational-methodological complex for the development of knowledge and literacy of students in the field of finance in the future work of young specialists-graduates;
- it is necessary to integrate financial and economic calculations in practical classes of mathematical subjects and implement interdisciplinary communication.

In conclusion, the preparation of mathematics teachers-students for the formation of financial literacy of students in their pedagogical activities is an urgent problem, and our idea to solve it contributes to the quality training of specialists.

Teaching them to do financial calculations in math class or extracurricular activities is important, it helps them develop their financial understanding and find solutions to life's problems.

Acknowledgment

The research is financed by the Abai Kazakh National Pedagogical University (scientific project, contract No. 46 dated May 28, 2024).

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