ISSN: 1991-3494 (Print)
ISSN: 2518-1467 (Online)

SCIENTIFIC JOURNAL OF PEDAGOGY AND ECONOMICS

№5
2025

ISSN 2518-1467 (Online),
ISSN 1991-3494 (Print)

CENTRAL ASIAN ACADEMIC
RESEARCH CENTER

SCIENTIFIC JOURNAL OF PEDAGOGY AND ECONOMICS

PUBLISHED SINCE 1944

5 (417)

September – October 2025

ALMATY, 2025

Scientific Journal of Pedagogy and Economics
ISSN 2518-1467 (Online),
ISSN 1991-3494 (Print).
Owner: «Central Asian Academic Research Center» LLP (Almaty).
The certificate of registration of a periodical printed publication in the Committee of information of the Ministry of Information and Communications of the Republic of Kazakhstan **No. 3620-Ж,** issued on 05.06.2025
Thematic focus: *«publication of the results of new achievements inthe field of fundamental sciences»*
Periodicity: 6 times a year.
http://www.bulletin-science.kz/index.php/en/

Scientific Journal of Pedagogy and Economics
ISSN 2518-1467 (Online),
ISSN 1991-3494 (Print).
Меншіктенуші: «Орталық Азия академиялық ғылыми орталығы» ЖШС (Алматы қ.).
Қазақстан Республикасының Ақпарат және коммуникациялар министрлігінің Ақпарат комитетінде 05.06.2025 ж. берілген **№ 3620-Ж** мерзімдік басылым тіркеуіне қойылу туралы куәлік.
Тақырыптық бағыты: *«іргелі ғылым салалары бойынша жаңа жетістіктердің нәтижелерін жариялау»*
Мерзімділігі: жылына 6 рет.
http://www.bulletin-science.kz/index.php/en/

Scientific Journal of Pedagogy and Economics
ISSN 2518-1467 (Online),
ISSN 1991-3494 (Print).
Собственник: ТОО «Центрально-азиатский академический научный центр» (г. Алматы).
Свидетельство о постановке на учет периодического печатного издания в Комитете информации Министерства информации и коммуникаций и Республики Казахстан **№ 3620-Ж,** выданное 05.06.2025 г.
Тематическая направленность: *«публикация результатов новых достижений вобласти фундаментальных наук».*
Периодичность: 6 раз в год.
http://www.bulletin-science.kz/index.php/en/

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SCIENTIFIC JOURNAL OF PEDAGOGY AND ECONOMICS
ISSN 1991-3494
Volume 5. Number 417 (2025), 75–88

https://doi.org/10.32014/2025.2518-1467.1024

IRSTI 14.25.09
UDC 37.013

© R.K. Izmagambetova[1*], M.N. Ospanbekova[2], N.S. Kozhamkulova[1], 2025.
[1]Abai Kazakh national pedagogy university, Almaty, Kazakhstan;
[2]Arkalyk Pedagogical Institute named after Altynsarin, Arkalyk, Kazakhstan.
E-mail: *izmagambetova1988@mail.ru*

FORMATION OF FINANCIAL LITERACY OF PRIMARY SCHOOL STUDENTS BASED ON ARTIFICIAL INTELLIGENCE

R. Izmagambetova — Ph.D., Postdoctoral fellow, Abay Kazakh National Pedagogical University, Almaty, Kazakhstan,
E-mail: izmagambetova1988@mail.ru, ORCID ID: https://orcid.org/0000-0002-8016-7526;
M. Ospanbekova — PhD, Associate Professor, Head of the Educational Program of Pedagogy and Methods of Primary Education, NJSC "I. Altynsarin Arkalyk Pedagogical Institute", Arkalyk, Kazakhstan,
E-mail: meirgul1976@mail.ru, ORCID ID: https://orcid.org/0000-0002-7470-6132;
N. Kozhamkulova — PhD, postdoctoral fellow, Abai Kazakh National Pedagogical University, Almaty, Kazakhstan,
E-mail: naztai_agu@mail.ru, ORCID ID: https://orcid.org/0000-0002-6668-7584.

Abstract. This article addresses the relevance of using artificial intelligence (AI) technologies in the formation of financial literacy among primary school students. Financial literacy is a crucial aspect of developing an individual's money management skills and making informed financial decisions. This issue has become particularly pertinent due to the rising financial dependency, increasing bank debts, and the overall decline in financial culture in society. The aim of the study is to explore the role of artificial intelligence in the formation of financial literacy in primary school students. The research investigates key elements of financial literacy, including budgeting, saving, spending, and financial planning, taught through AI-based digital tools. These tools allow students to simulate real-world financial situations, thereby enhancing their decision-making skills. Research methods included theoretical review, surveys, and experimental and statistical analysis. A survey conducted among primary school teachers involved 172 participants. Of these, 73.26% highlighted the importance of teaching financial literacy in primary school. Furthermore, the results demonstrate the effectiveness of digital content in teaching financial literacy. The findings indicate that the use of AI tools increases students' motivation and enables them to grasp financial concepts more easily and quickly. AI-based digital tools are tailored to individual learning needs, facilitating the development of students' financial skills. The practical significance of this research lies in the development of specialized digital learning tools and teaching methodologies aimed at enhancing financial literacy. These tools provide opportunities for improving the financial education process and promoting financial responsibility among students.

Keywords: Financial Literacy, primary school education, artificial intelligence (AI), digital tools, budgeting, interactive learning, personalized education

Funding: This research was conducted within the framework of the "Zhas Galym" grant project for 2024–2026, funded by the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan [grant number AP22684921].

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[1]Абай атындағы Қазақ ұлттық педагогикалық университеті,
Алматы, Қазақстан;
[2]Ы. Алтынсарин атындағы Арқалық педагогикалық институты,
Арқалық, Қазақстан.
E-mail: izmagambetova1988@mail.ru

БАСТАУЫШ СЫНЫП ОҚУШЫЛАРЫНЫҢ ҚАРЖЫЛЫҚ САУАТТЫЛЫҒЫН ЖАСАНДЫ ИНТЕЛЛЕКТ НЕГІЗІНДЕ ҚАЛЫПТАСТЫРУ

Р. Измагамбетова — Ph.D., пост-докторант, Абай атындағы Қазақ ұлттық педагогикалық университеті, Алматы, Қазақстан,
E-mail: izmagambetova1988@mail.ru, ORCID ID: https://orcid.org/0000-0002-8016-7526;
М. Оспанбекова — PhD, қауымдастырылған профессор, Бастауыш оқытудың педагогикасы мен әдістемесі білім беру бағдарламасының жетекшісі, «Ы.Алтынсарин атындағы Арқалық педагогикалық институты» КЕАҚ, Арқалық, Қазақстан,
E-mail: meirgul1976@mail.ru, ORCID ID: https://orcid.org/0000-0002-7470-6132;
Н. Кожамкулова — PhD, постдокторант, Абай атындағы Қазақ ұлттық педагогикалық универсиеті, Алматы, Қазақстан,
E-mail: naztai_agu@mail.ru, ORCID ID:https://orcid.org/0000-0002-6668-7584.

Аннотация. Бұл мақалада бастауыш сынып оқушыларының қаржылық сауаттылығын қалыптастыруда жасанды интеллект (ЖИ) технологияларын қолданудың өзектілігі қарастырылады. Қаржылық сауаттылық — жеке тұлғаның ақшаны басқару дағдыларын қалыптастыру және тиімді қаржылық шешімдер қабылдау үшін маңызды аспект болып табылады. Бұл мәселе қазіргі қоғамда қаржылық тәуелділіктің, банктік қарыздардың көбеюінің және халықтың жалпы қаржылық мәдениетінің төмендеуінің әсерінен ерекше өзектілікке ие. Зерттеудің мақсаты – бастауыш сынып оқушыларының қаржылық сауаттылығын қалыптастырудағы жасанды интеллекттің рөлін зерттеу. Зерттеу барысында қаржылық сауаттылықтың негізгі элементтері – бюджет құру, үнемдеу, шығындарды бақылау және қаржылық жоспарлау – ЖИ негізіндегі цифрлық құралдар арқылы үйретілді. Бұл құралдар оқушыларға

нақты өмірдегі қаржылық жағдайларды модельдеу арқылы шешім қабылдау дағдыларын дамытуға мүмкіндік береді. Зерттеу әдістері ретінде теориялық шолу, сауалнама жүргізу, эксперименттік және статистикалық талдау тәсілдері қолданылды. Бастауыш сынып мұғалімдері арасында өткізілген сауалнамаға 172 педагог қатысты, олардың 73,26%-ы қаржылық сауаттылықты бастауыш мектепте қалыптастырудың маңыздылығын атап өтті. Сонымен қатар, зерттеу нәтижелері цифрлық контенттің қаржылық сауаттылықты оқытудағы тиімділігін көрсетті. Нәтижелер бойынша, ЖИ құралдарын қолдану оқушылардың мотивациясын арттырып, қаржылық ұғымдарды жеңіл әрі жылдам меңгеруге мүмкіндік беретінін көрсетті. ЖИ негізіндегі цифрлық құралдар оқушылардың жеке қажеттіліктеріне бейімделіп, олардың қаржылық дағдыларын дамытуға ықпал етеді. Зерттеудің практикалық маңызы – қаржылық сауаттылықты қалыптастыруға бағытталған арнайы цифрлық оқу құралдары мен оқыту әдістемелерін әзірлеу қажеттілігін айқындау. Бұл құралдар қаржылық білім беру үдерісін жетілдіруге және оқушылардың қаржылық жауапкершілігін арттыруға мүмкіндік береді.

Түйін сөздер: қаржылық сауаттылық, бастауыш білім, жасанды интеллект (ЖИ), цифрлық құралдар, бюджет құру, интерактивті оқу, жеке білім беру

© Р.К. Измагамбетова[1*], М.Н. Оспанбекова[2], Н.С. Кожамкулова[1], 2025.
[1]Казахский национальный педагогический университет имени Абая,
Алматы, Казахстан;
[2]Аркалыкский педагогический институт имени Алтынсарина,
Аркалык, Казахстан.
E-mail: izmagambetova1988@mail.ru

ФОРМИРОВАНИЕ ФИНАНСОВОЙ ГРАМОТНОСТИ МЛАДШИХ ШКОЛЬНИКОВ НА ОСНОВЕ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА

Р. Измагамбетова — Ph.D., пост-докторант, Казахский национальный педагогический университет имени Абая, Алматы, Казахстан,
E-mail: izmagambetova1988@mail.ru, ORCID ID: https://orcid.org/0000-0002-8016-7526;
М. Оспанбекова — PhD, ассоциированный профессор, руководитель образовательной программы педагогики и методики начального обучения, НАО «Аркалыкский педагогический институт имени И. Алтынсарина», Аркалык, Казахстан,
E-mail: meirgul1976@mail.ru; ORCID ID: https://orcid.org/0000-0002-7470-6132;
Н. Кожамкулова — PhD, постдокторант, Казахский национальный педагогический университет имени Абая, Алматы, Казахстан,
E-mail: naztai_agu@mail.ru, ORCID ID:https://orcid.org/0000-0002-6668-7584.

Аннотация. В данной статье рассматривается актуальность использования технологий искусственного интеллекта (ИИ) для формирования финансовой грамотности у младших школьников. Финансовая грамотность является важным аспектом развития навыков управления личными финансами и принятия обоснованных финансовых решений. Эта проблема становится особенно значимой в условиях роста финансовой зависимости населения, увеличения объёмов банковских задолженностей и снижения общего уровня финансовой культуры в обществе. Цель исследования – определить роль искусственного интеллекта в процессе формирования финансовой грамотности у учащихся начальных классов. В рамках работы проанализированы ключевые элементы финансовой грамотности, такие как составление бюджета, сбережения, контроль расходов и финансовое планирование, которые изучаются с применением цифровых инструментов на базе ИИ. Эти инструменты позволяют учащимся моделировать реальные финансовые ситуации, развивая тем самым навыки принятия решений и практического применения полученных знаний. Методы исследования включают теоретический обзор, анкетирование, экспериментальные и статистические методы анализа. В опросе приняли участие 172 учителя начальных классов, из которых 73,26% отметили важность формирования финансовой грамотности на уровне начальной школы. Полученные данные подтвердили эффективность использования цифрового контента для обучения финансовой грамотности. Результаты исследования показали, что применение инструментов ИИ способствует повышению мотивации учащихся, облегчает усвоение финансовых концепций и делает процесс обучения более интерактивным. Цифровые технологии на основе ИИ адаптируются под индивидуальные потребности обучающихся, что способствует формированию устойчивых финансовых навыков и повышению их самостоятельности. Практическая значимость исследования заключается в разработке специализированных цифровых учебных средств и методических подходов, направленных на формирование финансовой грамотности у младших школьников. Применение таких инструментов позволяет совершенствовать процесс финансового образования и способствует развитию ответственного отношения к личным финансам у подрастающего поколения.

Ключевые слова: Финансовая грамотность, начальное образование, искусственный интеллект (ИИ), цифровые инструменты, бюджетирование, интерактивное обучение, персонализированное обучение

Introduction. In the 21st century, humanity faces a number of global problems. Namely: the growth of people's debts to a bank or an individual; income inequality, which causes social problems such as unemployment and poverty, leads to the collapse of various types of crime, discrimination, and spiritual and moral values.

Enhancing the financial literacy of primary school students is a crucial issue today, as it serves as a means to address complex social issues. Because the formation of financial literacy in primary school students is the initial stage of increasing the economic culture of citizens in society. Teaching aids based on digital contentment form the financial literacy of primary school students, help regulate value orientations, contribute to the formation of their attitude toward social and material factors, and determine high spiritual and moral goals. Consequently, the lack of fundamental and applied research based on the achievements of digital technology in improving the quality of education of primary school students determines the relevance of the topic.

In recent years, the problem of financial literacy has been reflected in a number of regulatory and conceptual documents in the country. For example, the concept of improving financial literacy for 2025-2030 states "formation of an institutional base of methodological and educational resources, including in digital format, as one of the types of measures to improve the economic literacy of young people in society" ("on approval of the concept of improving financial literacy for 2025-2030", 2025).

Based on this concept, a training manual was developed on the basis of digital content, drawing up tasks using a neuroset, etc.

In his address to the people of Kazakhstan, the head of state, K. Tokayev, noted that recently the dependence of people on loans and low financial literacy has become a big social problem; therefore, it is important to increase the financial literacy of students in universities and secondary schools (Tokayev, 2023). The Organization for Economic Cooperation and Development (OECD) also argues that financial literacy should be taught to students from an early age (Good Practices on Insurance Intermediaries' Role in Financial Education and Consumer Protection (forthcoming) / OECD. – 2010. –Electronic text data. – Mode of access: http://www.financial-education.org/pages/ 0,3417, en_39665975_39667032. Html).

In the practice of Primary Education, comprehensive knowledge of financial literacy in general is not provided, unless the knowledge is partially included in the curriculum of individual disciplines (World Studies, Mathematics). Therefore, the development of special digital content in the direction of the formation of financial literacy of primary school students and its introduction into the process of primary education is a problem that arises from the demand of society.

To achieve this goal, based on the works of domestic and foreign scientists, it is necessary to analyze the methodological, scientific, and pedagogical foundations of financial education for primary school students, develop a concept, and determine an effective model of economic education for students through digital content.

In the scientific article of the authors A. Zhumabaeva et al. (2024), they study the impact of mobile technologies and tools on the educational process and the attitude of students toward them. Scientists say that in the ultramodern world, there is a process of increasing the importance of access to information and communication. It is impossible to imagine a person living without a tablet or smartphone. The capabilities and potential of mobile devices are rapidly expanding, the availability of mobile phones is spreading far and wide, and mobile operations are in demand all over the world. The ease and versatility of using these mobile technologies has made it possible to become a useful tool in the lives of both young people and the elderly. The active use of smartphones and tablets in society has increased the need and demand for the integration of mobile technologies into the educational process, concludes (Zhumabaeva et al., 2024).

We believe that through digital content that teaches financial literacy (audio and video content, a web site, a manual developed on the basis of digital content, didactic materials), students will be able to apply the knowledge gained and develop the most important elements of financial behavior and self-control skills. The digital educational content developed for primary school students will expand the availability of additional education in the formation of financial literacy.

As stated in the document "On approval of the concept for the development of digital transformation, information and communication technologies, and cybersecurity for 2023-2029", the issues of developing digital knowledge of students should be implemented in the process of primary education, taking into account the latest trends in the global economy (Resolution of the government of the Republic of Kazakhstan dated March 28, 2023 No. 269 on approval of the concept for the development of digital transformation, information and communication technologies and cybersecurity for 2023-2029).

Here, on the one hand, the financial literacy of primary school students increases, on the other hand, the necessary knowledge and skills, through the safe and efficient use of digital technologies and internet resources.

At the same time, through digital content, creative and research activities of students are developed. Students learn to search for information, process, compare, evaluate, analyze, and draw conclusions.

Scientists (Zhumabaeva et al., 2022): Given that we live in the "Mobile Age", mobile technologies have an impact on every aspect of life. One of them is the field of education, that is, knowledge that is obtained independently through a smartphone or the internet. It is a knowledge that has many possibilities and is interesting but unsystematic, quickly assimilated, and quickly forgotten, - she argues.

From this point of view, for the formation of financial literacy in primary school students, it is necessary to develop accessible digital content, which will be presented through any information or media content that will be created, stored, and transmitted in digital format. It covers a wide range of content types, such as podcasts, practical exercises transmitted through web-text, audio, video, and interactive multimedia games, and teaching aids developed on the basis of digital content.

Training primary school students in financial literacy is to improve the student's ability and willingness to successfully fulfill individual socio-economic roles (landlord, investor, borrower, taxpayer, etc.) by educating them about skills, abilities, and attitudes in the financial sector. The main characteristic of effective financial education programs in both elementary and high school is that students feel the impact of their decisions through active participation in the learning process. In general, "financial literacy education" is not only about acquiring new skills but also about learning how to apply these skills and, based on this, helping students gain experience. Here we conclude that digital technological tools meet the needs and requirements of modern students.

Research materials and methods. Within the framework of the proposed topic, a survey was conducted to determine the views of primary school teachers, guided by the scientific works analyzed in the article. Based on the results of the survey, "6B01301- Pedagogy and Methods of Primary Education, which will be developed in the training of future specialists in the 2024 academic year is the introduction of the discipline "Formation of financial literacy of primary school students" into the educational program.

The survey was conducted for primary school teachers in Arkalyk, Kostanay region. 172 respondents took part in the survey. The following questions were asked in the questionnaire:

1. What do you know about the formation of financial literacy in students from primary school?
2. How important is it for you to form the financial literacy of primary school students?
3. Do you agree with the opinion that today the financial literacy of students should be formed from elementary school?
4. What contributes to the formation of financial literacy in primary school students?
5. What tools do you think are of particular importance to you in the formation of financial literacy among primary school students today?
6. What would you suggest as a future specialist to form the financial literacy of primary school students?

Research results and discussion. A comparative analysis of the survey results was carried out, which made it possible to analyze the effectiveness of the developed educational and methodological complex.

In accordance with this problem, an analysis of the psychological and pedagogical scientific literature is carried out. A Google Form and direct author's survey of primary school teachers was conducted. In order to collect materials on the development of an educational and methodological complex in the direction of the formation of financial literacy of primary school students, the results of their processing were analyzed and obtained. Within the framework of this topic, theoretical, empirical, and statistical methods are widely used.

In Question 1, which was proposed in the survey, the majority of respondents indicated that they had never heard of the formation of financial literacy of students from primary school (83.14%), and some (16.86%) had incomplete understanding.

How important is it for you to form the financial literacy of primary school students? In Question 2, 73.26% of the survey participants indicated that they were correct due to current social problems, while 26.74% indicated that they should not be a special subject but an additional optional lesson. The financial literacy of students today should be formed from primary school. The respondents were 100% positive about Question 3.

What contributes to the formation of financial literacy in primary school students? In Question 4, 37% of respondents said that there are no additional educational materials aimed at forming the financial literacy of primary school students, and 27% said that special training programs are not provided. 14% indicated that there is no digital content available to students, and 22% indicated that school textbooks also contain a very small amount of special topics in this area.

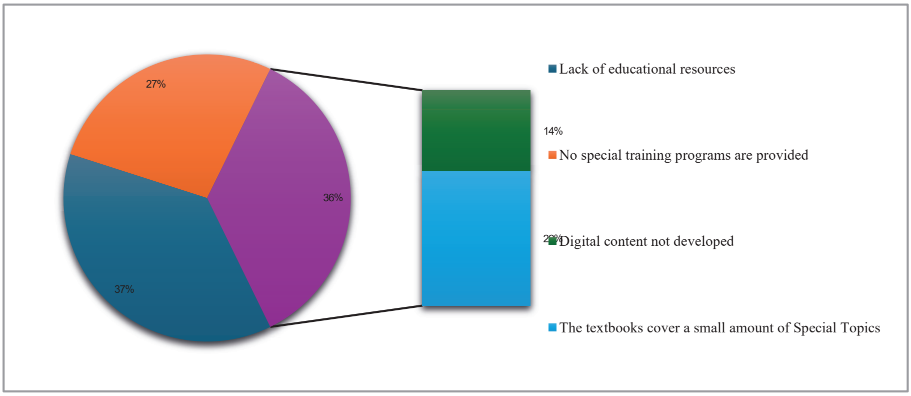

Figure. 2 - Indicator of Question number 4 of the questionnaire

What tools do you think are of particular importance to you in the formation of financial literacy among primary school students today? In question 5, 72.7% of the survey participants noted digital content, and 27.3% said that it is an educational and methodological complex developed on the basis of the school curriculum. What would you suggest as a future specialist to form the financial literacy of primary school students?

The proposal of the respondents to the question was as follows:

- introduction of a special discipline aimed at the formation of financial literacy in primary school students;
- develop additional teaching aids aimed at the formation of financial literacy in students;
- develop special digital content aimed at the formation of financial literacy, taking into account the transition of students to mobile education.

Based on the results of the survey, an elective course program "Formation of financial literacy of primary school students" was developed for future primary school teachers of the university. Educational program 6B01301 - Pedagogy and Methods of Primary Education created a single platform for higher education, epvo.kz, on April 25, 2025, and registered it for the 2025 academic year (*https://epvo.kz/#/register/education_program/application/54053*).

In the process of mastering the discipline, students form the financial literacy of primary school students. Students acquire the skills and knowledge necessary to make financial decisions, plan budgets, manage debts, invest, and explain basic financial concepts. Some of the main aspects of financial literacy that are offered to primary school students are: money and coins; budgeting; savings; debts; mastering the methodology of giving an initial understanding of procurement planning.

In domestic practice, the agency for regulation and development of the financial market of the Republic of Kazakhstan has developed a mobile application, "Fingramota Online", in order to improve the financial literacy of the population. This is a unique platform in Kazakhstan for the development of financial literacy of people of different ages, including primary school students. "Fingramota (site) improves financial literacy of the population". Source: https://fingramota.kz/kk/news/post/fingramotakz-balalar-arnal-arzhyly-osymshany-trtinshi-shyarylymyn-synady).

However, in our opinion, we believe that it is more effective to systematically prepare for each class a curriculum suitable for the age of primary school students and a corresponding educational and methodological complex (a manual developed on the basis of digital content, a methodological guide for teachers, etc.).

In foreign practice, for example, in schools in the countries of the European Union, in particular in the Netherlands, great attention is paid to financial education. International Program "Aflatoun" to develop children's financial literacy was launched. According to the recommendations of the OECD, the European Commission, and other international organizations, basic financial education topics (e.g., savings, investing, budgeting, financial risks, being a smart consumer, etc.) are included in the curriculum of primary and secondary schools (Kuzma et al., 2023).

In the article "Review of financial literacy education programs for children and adolescents" (Amagir, et al., 2018), the authors find that most financial education programs in general education schools are focused on teaching topics such as income-expense, credit, savings and investment, and budget. In several effective financial education programs in primary schools, priority is given to "experiential learning."

The authors point out that in primary school it is necessary to pay attention to "applied pedagogy", the main characteristic of which is "doing by learning".

In high schools, financial education programs focus mainly on issues related to budgeting, credit card use, and forced spending decisions. The article found that there are no fundamental differences in financial education programs between countries.

The authors consider three components in determining financial literacy: knowledge and understanding, skills and behavior, mood and confidence (Artavanis & Karra, 2020).

Authors (Drever et al., 2015), differentiating the qualities needed to achieve financial goals, establish that financial education activities for children include teaching executive functions and basic financial skills such as coin recognition.

In message to the people of Kazakhstan, "Economic orientation of just Kazakhstan" K. Tokayev noted that in world practice, since 2003, the Organization for Economic Cooperation and Development (OECD) has been engaged in financial education. The OECD considers three aspects: knowledge and understanding; skills and behavior; mood and confidence combine into one concept of financial literacy: knowledge and understanding of financial concepts and risks; skills; motivation and confidence in applying this knowledge and understanding to make effective decisions in various financial contexts, improve the financial well-being of individuals and society, and ensure participation in economic life (Tokayev, 2023).

These documents emphasize that in order to effectively coordinate, develop financial education programs, prepare advanced methodologies, and educate people as early as possible, it is necessary to start improving financial literacy from primary school.

Researchers (Artavanis & Karra, 2020) in a scientific article on "Financial literacy and student debt" studied the level of financial literacy of their students and its impact on student debt repayment. The article, based on survey responses, found that students with a financial literacy deficit do not competently assess loan payments.

Researchers (Lusardi Annamaria & Olivia S. Mitchell, 2014), while conducting a study on financial literacy among young people, noticed that 35–40 percent of young people make a lot of mistakes when making important decisions about finance, although they know simple basic concepts such as bank interest rates and inflation.

Comprehensive research on the formation of financial literacy in students of primary school age has not been conducted; it can be said that there are no articles at all. There is a lack of research on how to improve financial literacy in elementary school.

According to the researchers (Paatova & Daurova, 2014), it is believed that "the increase in financial literacy for schoolchildren should be started before adolescence".

Researchers (Ratna Candra Sari et al., 2022) identify the effectiveness of an AR-based short story collection in improving understanding of financial literacy by identifying key executive functions in his work, which aims to develop and test the effectiveness of a collection of financial literacy stories as an activity aimed at creating executive functions for early childhood children. The results of the study show a significant increase in knowledge about honesty, discipline, and money management.

An article by Sherraden, Johnson, Guo, and Elliott (2011) examines quantitative and qualitative data to analyze the impact of a financial education program called "I can save" (ICS) on financial literacy in an innovative four-year primary school. Elementary school students who participated in the program scored significantly higher on the financial literacy test conducted in the fourth grade than in the comparison group at the same school. According to the results of this study, teachers stated that if from an early age children were given financial education, constantly involved in financial services organized in a playful and practical way, in the future they would prepare them for making the right decisions in an increasingly complex economy from year to year (Sherraden et al., 2011).

Currently, researchers agree that the optimal period for the development of financial literacy is preschool and primary school age, because at the age of 6–8 years, children can sort out coins and bills, study their prices, and begin to understand how money comes. Over time, children will understand that they need money to buy some product, and the child will have a willingness to acquire their own education. This readiness is determined by the presence of certain physiological and psychological prerequisites that can give high results when interacting with favorable pedagogical conditions.

Digital content, that is, games, a set of information materials distributed through special resources, is important and interesting for primary school students. Because the main types of modern digital content are interactive multimedia games, video and audio materials are transmitted on digital devices (computer, tablet, smartphone).

Knowledge, abilities, skills, and attitudes in the field of finance acquired by primary school students through digital content include the cognitive, activity, and value-motivational components of financial literacy. The cognitive component includes a system of knowledge in the field of personal finance. Students will be able to assess specific financial situations, find and apply the necessary information to solve them, and also develop their financial competence in the process of self-education. The activity component improves skills that allow you to organize and identify personal financial activities, such as research, organizational, analytical, etc. The value-motivational component includes a system of personal significant motives and values; this component forms responsibility in financial activities and a positive attitude toward improving financial literacy, trust, and independence.

Conclusion. Exposure to various financial barriers in society is the result of a complete lack of financial literacy in a person. Therefore, the formation of financial literacy in elementary school helps students to socialize and achieve success in the future and helps to reason how the economy works in society to form the right attitude towards money. Education of financial literacy will help to understand that money is earned by labor and legal means to compare it with savings. Develops the student's quality of competent financial management and contributes to a clear understanding of how money works and how to earn and manage it.

Currently, within the framework of the "Concept of improving financial literacy for 2020-2024" implemented in the country, one of the most pressing issues is the search for tools that contribute to the formation of financial literacy in primary school students.

Within the framework of the topic, priority is given to improving financial literacy and the availability of services, promoting the formation of an institutional base of methodological and educational resources, including in digital format, as a mechanism for its solution. Thus, the most effective way to solve this problem is to develop digital content in the direction of the formation of financial literacy among primary school students and introduce it into the educational process.

It is necessary to develop an increase in financial literacy in primary school based on digital content that is of interest to students, which they can use in any situation.

The analysis of the development of financial literacy, considered in foreign practice in the implementation of the proposed problem, revealed the high potential and effectiveness of the proposed project and made it possible to draw a number of valuable conclusions about digital content.

The scientific novelty of the research carried out within the framework of the topic was the preparation and implementation of a special elective course for future primary school teachers.

Financial literacy is considered a combination of knowledge, skills, and attitudes in the field of financial behavior that leads to an improvement in the well-being and quality of life of the student.

It is focused on the assumption that one of the most important needs for the formation of financial literacy of primary school students from an early age through digital content provides for the acquisition of special competencies in terms of financial literacy.

A tool that contributes to the effectiveness of the process of forming financial literacy of primary school students is digital educational content, if:

- the main problems and prospects for the formation of financial literacy of primary school students through digital content are analyzed and a concept is developed;

- introduction of educational programs for the formation of financial literacy through digital content for primary school students and the textbook "financial alphabet," developed in digital format;

- to determine the experience and results of testing by conducting scientific events (action learning, webquests, World Cafe, scientific and practical conferences, courses for primary school teachers).

Әдебиеттер

«Қаржылық сауаттылықты арттырудың 2020-2024 жылдарға арналған тұжырымдамасын бекіту туралы» Қазақстан Республикасы Үкіметінің 2020 жылғы 30 мамырдағы № 338 қаулысы (2020). https://adilet.zan.kz/kaz/docs/P2000000338.

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www: nauka-nanrk.kz
ISSN 2518–1467 (Online),
ISSN 1991–3494 (Print)
http://www.bulletin–science.kz/index.php/en

Ответственный редактор **А. Ботанқызы**
Редакторы: **Д.С. Аленов, Т. Апендиев**
Верстка на компьютере: **Г.Д. Жадырановой**

Подписано в печать 31.10.2025.
Формат 60х881/8. Бумага офсетная. Печать - ризограф.
46,0 п.л. Тираж 300. Заказ 5.

«Central Asian Academic Research Center» LLP
Алматы, Қонаев к-сі, 142