Published in the USA
Media Education (Mediaobrazovanie)
Issued since 2005.
ISSN 1994-4160
E-ISSN 1994-4195
2026. 22(1): 60-69

DOI: 10.13187/me.2026.1.60
https://me.cherkasgu.press

Digitalization of the Preschool Education System in the Russian Federation and the Problems of Media Education Development

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Abstract

Advances in digital technology are rapidly transforming education. The primary instrument for implementing digitalization measures for general education in Russia until 2025 was the federal project "Digital Educational Environment" under the National Project "Education". The project aims to create and implement a digital educational environment in educational organizations and ensure the digital transformation of the education system. The project includes equipping organizations with modern equipment and developing digital services and content for educational activities.

Over the past decade, there has been an annual increase in the availability of computer equipment for teachers and preschoolers in preschool educational organizations, with 66.2 % of computers having internet access. However, regional and territorial disparities persist in the availability of computers available for use by preschoolers, as well as in the proportion of computers connected to the Internet. Using statistical data, this article analyzes the availability of computer equipment in preschools, examines digitalization expenditures, and examines regulatory requirements for the use of electronic learning tools by preschool children.

The level of adoption and application of digital technologies in early childhood education and upbringing is one of the indicators of a preschool's educational success and, in essence, an element of its modern image, as well as an opportunity to present and promote its achievements. Modern digital technologies, when used competently, take preschool education to a fundamentally new level of clarity, interactivity, and objectivity. The ability to utilize multimedia and interactive digital technologies in the educational process of preschool organizations, the ability to create one's own media texts, and the ability to apply them in professional activities are fundamental priorities of the new style of teaching, which presupposes an adequate level of media culture – media education.

Thus, the implementation of digital technologies and the development of media education stemming from the existing model of media and information literacy are essentially two sides of the same process – digital transformation within a new coordinate system of informatization and media education in preschool education. At the same time, the prospects for educational development are linked to the further development of digital services and content for educational activities, as well as the implementation of modern technologies such as artificial intelligence, neural networks, and virtual and augmented reality, the effectiveness of which in preschool education is still unclear.

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Keywords: early childhood care and education (ECCE), preschool education, information society, media culture, media education, financing, digital technologies, digital transformation.

1. Introduction

The goal of the strategic direction in the field of digital transformation of general education is to achieve a high level of digital maturity in the education sector through a unified, high-quality, and secure educational space, built to provide equal access to high-quality, verified digital educational content and digital educational services throughout the Russian Federation for all categories of educational participants. Its implementation envisions the creation of conditions for the functioning of an electronic information and educational environment, including electronic information resources, electronic educational resources, a combination of information technologies, telecommunications technologies, and related technological tools, ensuring students fully master educational programs, regardless of their location.

With the widespread adoption of digital educational platforms (Russian Electronic School, Moscow Electronic School, etc.) and distance learning technologies, the issue of structural changes and forecasting resource needs for regional general education systems, including preschool education, remains relevant. Using federal statistical data, this article analyzes the availability of computers in kindergartens and examines digitalization expenditures. It also examines regulatory legal acts containing sanitary and epidemiological requirements for organizations providing education, training, recreation, and health services for children and youth, hygiene standards, and requirements for ensuring the safety and/or harmlessness of environmental factors for humans. It also includes recommendations for ensuring sanitary and epidemiological compliance when implementing educational programs using e-learning and distance learning technologies.

However, neither digital transformation nor digital technologies without the skills to use them will solve the problem of information technology and media education, including in the preschool education system. The development of an information educational environment in a kindergarten is virtually impossible without the development of a media culture among all participants in the upbringing and education process. Moreover, media culture is seen as a new paradigm for personal development in modern education.

In 1995, E.A. Bondarenko proposed a definition of media culture as a culture of dialogue in the media space. She later clarified this concept: "Media culture is the culture of polylogue (multilateral dialogue) in the information space of mass communications." Media culture encompasses the language of communication studies, its sign structure and symbolism, human behavior in the media environment, the characteristics of information perception, literacy, and the culture demonstrated in the creation of media messages. Furthermore, according to a number of other experts, media culture will prepare future citizens from a very early age through education, possibly with an introduction to the basic elements of critical thinking and a culture of information security (Bondarenko, 2004; Gálik, 2020; Gálik et al., 2024).

According to A. Nemiritch, one of Russia's leading experts in preschool media education, an individual's media culture is the sum of their material and intellectual assets in the media, a historically defined system of their reproduction and functioning in society, and the enrichment of sociocultural experience in the media. The media culture of a preschool teacher involves not only the ability to work with a computer and other electronic devices, create their own web portfolio, and interact with colleagues within online partnerships, but also the ability to rationally organize work on the use of information technology in the educational process. Accordingly, the informatization of a preschool organization is understood not as a simple presentation of educational and educational information using electronic educational resources, but as the creation of a pedagogically designed media educational environment, connected to the global media educational space and satisfying the cultural and educational needs of a modern preschooler (Nemirich, 2011).

2. Materials and methods

The study of digitalization of the preschool education system is driven by the need to achieve a high level of digital development based on a unified educational space throughout the country for all categories of participants in educational relations.

The objective of the study, conducted in 2024–2025 by the Center for Continuous Education Economics of the Presidential Academy of National Economy and Public Administration, was to

assess the level of digitalization in the period 2024–2025 and justify the costs of implementing and using digital technologies in the preschool education system.

To achieve the set goal, the following research methods were used: analysis of statistical data, monitoring, and generalization.

The information base for the study consisted of data from the federal statistical observation form on the activities of an organization implementing educational activities in preschool education programs, childcare and supervision.

In parallel, specialists from the RANEPA Center for Continuous Education Economics, the Moscow State Institute of Culture, the Association of Film and Media Education of the Russian Federation, the International Pedagogical Academy of Preschool Education, and the Information for All public movement analyzed the state and development of media education and film pedagogy in early childhood education through relevant events and publications held in recent years.

3. Discussion

Various aspects of the development and forecasting of the general education system have been repeatedly examined by Russian and international researchers. The application of information and communication technologies in general education has been a prominent topic of research. Monographs, articles, and analytical reports have been devoted to assessing the effects and risks of the digital transformation of education, the impact of the pandemic on the development of online education, information support for the educational process, analysis of distance learning experiences, and the specifics and challenges of organizing the educational process remotely (Geyn, 2024; Giannini, 2023; Milovanov, 2021; Rudnik et al., 2024; Selina, Kondrateva, 2024; Semenov, Vishnyakov, 2021; UNESCO, 2023; Vodopian et al., 2023; West, 2023; Williamson et al., 2024; Zaslavskaya, Kashkarova, 2024; Zhukova, 2024).

The opinions of participants in educational relations, namely teachers and parents of students, about the process of distance learning, its pros and cons were studied (Dukhanina, Maksimenko, 2021; Goshin et al., 2024; Semionova et al., 2022; Tishchenko, Tokareva, 2022). Various aspects of teachers' readiness to implement distance learning (Dvoretskaya, Mertsalova, 2024; Semionova, Tokareva, 2020; Tarasova et al., 2021), including teaching children with special educational needs, were studied (Dolgaya, Tagunova, 2019). The practice of using distance learning technologies in the system of advanced training for teachers has been substantiated (Grinshkun, Suvorova, 2024; Komarova, 2018).

Research into preschool education issues has also been reflected in scientific publications. New trends in the content of preschool education today have been revealed. One of these is the development of environmental education for preschoolers, the creation of specially organized educational environments for the greening of childhood, incorporating knowledge about the natural world, interdependent relationships, and unique ways to preserve and enhance the natural world (Demidov et al., 2020).

The study examined the preparedness of preschool teachers, whose competencies should include ethical and legal knowledge, biophysiological training, knowledge in the field of ecology and sustainable development, training in science, bilingual training, technological training, digital skills and competencies based on the ECDL principle (Komarova, 2018).

The issue of both the positive and negative impact of using information and communication technologies in the educational process was considered. It was emphasized that, compared to traditional forms and means used in preschool education, information and communication technologies enable the presentation of information on a highly emotional and aesthetic level, open up new ways of constructing abstract objects, develop research and creative skills, and allow for the presentation of a significant amount of didactic material in a playful manner, among other advantages. However, the use of ICTs in preschool education can lead to children becoming passive consumers, addicted to computer games, isolating them from real-life interactions with peers, and concerns are raised about the potential delay in preschoolers' speech development (Moskvina et al., 2018).

The potential for using online technologies and digital environments as equal learning mechanisms alongside traditional forms of education was analyzed. However, the challenges of organizing such a model of educational process with preschool and primary school children were noted, as self-regulation and learning motivation in children of this age are still developing and do not allow for independent learning or minimal adult supervision (Belolutskaya et al., 2023).

The authors examined the influence of the modern media environment on individuals as a source of "parallel education". These influences include the growing number of information sources, expanded access to information, increased density of information flows, and increased risks of media aggression. They substantiated the need to develop media culture as a new type of culture, creating a system of comprehensive media education, and a media space for educational organizations aimed at developing children's cognitive and creative activities (Bondarenko, 2015).

Given that 21st century children are already engaged in media exploration from the age of two, the issue of the preschool education system's readiness to operate in a digital educational environment deserves special attention. One promising area for developing such readiness could be the creation of a special cultural and educational cluster that would integrate previously accumulated materials for preschool development into a media education system, as well as opportunities for children to adapt to modern digital developmental and educational environments from an early age (Bondarenko, Demidov, 2020).An important aspect remains interaction with organizations providing additional education for children (Bondarenko et al., 2024), as well as the formation and development of media culture and media literacy among educators and parents of preschoolers (Demidov, 2020).

Issues of media education development were widely reflected in expert discussions at events dedicated to the problems of general and additional education.

On June 30, 2023, the RANEPA Center for Continuous Education Economics, the Moscow State Institute of Culture, the Information for All public movement, and partners at the Presidential Academy held an expert seminar, "Additional Education for Children and Youth in Film and Animation: Challenges of Interdepartmental and Intersectoral Coordination". Representatives of education, culture, and science authorities, heads of educational organizations, teaching staff, representatives of the professional community, and leading experts participated. Participants emphasized the importance of developing media education in shaping the spiritual and moral values of children and youth. I.V. Karakchieva, Deputy Director of the Department for National Project Support and Project Organization at the Ministry of Science and Higher Education of the Russian Federation, noted the particular importance of developing value orientations, as serious challenges persist both in the education of the younger generation and in developing the basic needs of children and youth. Harmonizing these relationships is crucial to the development of a well-rounded, patriotic, and socially responsible individual. A.V. Fedorov, laureate of the UNESCO Global Media and Information Literacy Award, and head of the Media Education program at the Information for All public movement, emphasized the need to develop an ideological concept as an element of national information policy (Levitskaya, Fedorov, 2020).

From September 24–27, 2024, the All-Russian Forum and Exhibition "Ecosystem of Preschool Childhood" was held at Expocentre. It was initiated by the International Pedagogical Academy of Preschool Education, a partner of the Moscow State Institute of Culture, together with Expocentre, with the support of the Federation Council and the State Duma. The forum focused on areas related to the introduction of innovations in preschool education: new approaches to the formation of the subject-spatial environment of kindergartens in the context of digital transformation; the development of new constructs of the cultural and educational environment, including the use of means and methods of film education, media pedagogy, animation, etc. At the Forum venue, a team from the International Pedagogical Academy of Preschool Education, the Moscow State Institute of Culture, the RANEPA Center for Continuous Education Economics, and the Information for All public organizations organized and held an expert dialogue "Media Space in Preschool Education," which featured reports by I.I. Komarova, "Media Environment of a Preschool Organization: Fundamentals and Risks of Formation," E.A. Bondarenko's "Artificial Intelligence and Cinematography: Teaching Intuition", and A.A. Demidov's "Animation on Your Smartphone" as a Universal Model for Involving Older Preschoolers in the Creation of Animated Content and for Early Career Guidance".

It was noted that the project's initial target audience was children and adolescents aged 7 to 20, but the lower age limit has now been expanded to 5 years old – the age when children begin to actively engage with animation. With the right approach to implementation, the project not only develops creative skills but also helps children better understand how modern media works. The Forum also featured a case study event, "The SMART Library of a Kindergarten. Reading as Education, Reading as Development, and Reading as Entertainment in Preschool Childhood". The event featured a paper by I.I. Komarova, "Reading Circle in Preschool Education. Changes and

Gaps," and a presentation by A.A. Demidov, "The Smart Library as a New Entity for Digital Transformation".

SMART libraries are a new trend in library services, reflecting the digital transformation of society. The creation of SMART libraries and game libraries in kindergartens as spaces where preschoolers can become familiar with books, cartoons, films, multimedia, and educational games before entering school seems relevant, although the methodology and techniques for this process are still under development. Furthermore, given that children have access to smartphones and tablets from an early age, health issues related to their use of gadgets require attention, which essentially means fostering a culture of information security in preschoolers, logically linked to their access to communication tools and information technology.

4. Results

Between 2019 and 2024, there was a decrease in the number of preschoolers per computer available for use by children. However, starting in 2019, a downward trend in the number of children has been observed, which may impact this indicator. The results of calculations based on official statistical data (Information..., 2014–2024) are presented in Figure 1 below.

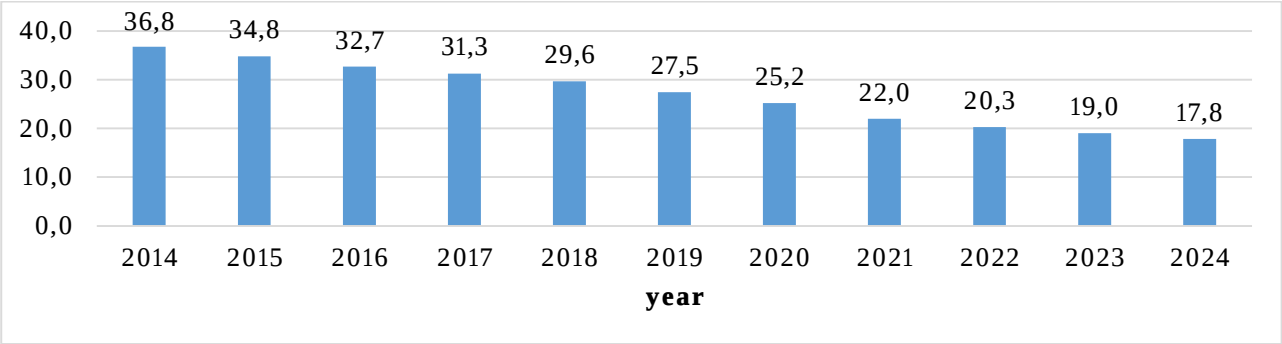

Fig. 1. Number of preschoolers per computer available for use by children, units

The share of computers in preschool educational organizations with internet access in 2024 was 66.2 %, which is 12 percentage points higher than in 2014 and 1.2 percentage points higher than in the first pandemic year of 2020. The results of calculations based on official statistical data (Information..., 2014–2024) are presented in Figure 2 below.

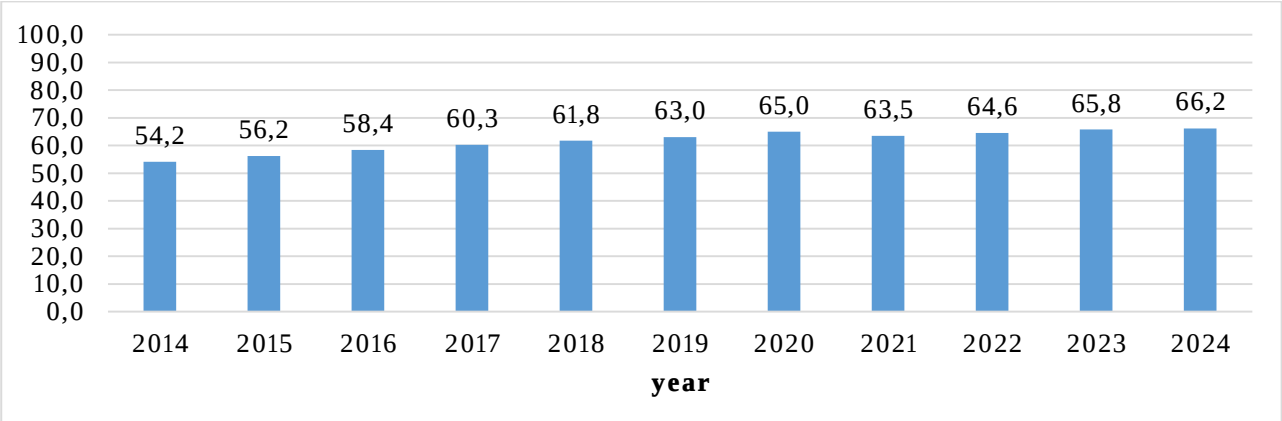

Fig. 2. The share of computers in preschool educational organizations with internet access, %

Between 2019 and 2024, there was a decrease in the ratio of preschool teachers per computer. However, starting in 2020, a downward trend in the number of preschool teachers has been observed, which may impact this ratio. The results of calculations based on official statistical data (Information..., 2014–2024) are presented in Figure 3 below.

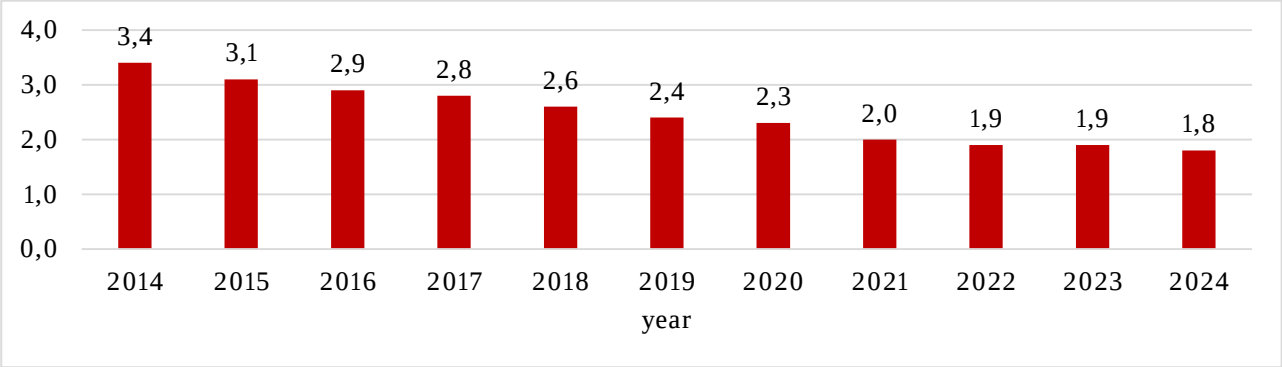

Fig. 3. Number of teaching staff per personal computer, people

Regulatory requirements for the use and duration of use of electronic learning tools (ELT) include:

classes using ELT are not held for age groups under 5 years old;

to determine the duration of use of the interactive whiteboard (panel), the total time of its use in the lesson is calculated;

to calculate the duration of use of individual use ELT, the continuous duration of their use in the lesson is determined;

when using two or more ELTs, the total operating time with them should not exceed the maximum for one of them (Methodological..., 2023; Resolution..., 2020; Resolution..., 2021).

Information on the duration of use of electronic learning tools is provided in Table 1 below.

Table 1. Duration of use of electronic learning tools

Age	Electronic learning tools	During the lesson, min., no more	Total per day in preschool educational organization, min., no more than
5-7 years	Interactivewhiteboard	7	20
	Interactivepanel	5	10
	The duration of continuous use of the screen when using the ELT with the demonstration of educational films, programs or other information intended for its recording by pupuls should not exceed	5-7	-
6-7 years	Personalcomputer	15	20
	Laptop	15	20
	Tablet	10	10

The overall availability of accessible computers for preschoolers aged 6 and over is 23 per computer, with the highest percentage found in the Ural and Far Eastern Federal Districts.

The share of organization computers available for use by preschoolers overall is 18.6 %, with the highest value observed in the Central and Volga Federal Districts.

The share of computers with internet access available for use by preschool children overall is 47.9 %, and the highest figure is recorded in the Central and North Caucasian Federal Districts.

According to the latest available data for 2022, the share of preschool educational organizations equipped with electronic learning tools was as follows: 76 % with interactive whiteboards/tables, 58.7 % with computer games for educational purposes, and 4.8 % with digital (interactive) floors. Preschool educational organizations were best equipped with interactive whiteboards/tables and digital (interactive) floors in the Northwestern and Ural Federal Districts, and with computer games for educational purposes in the Central, Northwestern, and Ural Federal Districts.

In terms of internet access speed, preschool educational organization buildings are distributed as follows: in one-third of buildings (33.3 %), internet access speeds range from 2 to

22.9 Mbps, in 10.2 % of buildings, speeds exceed 50 Mbps, and in 17.5 %, speeds exceed 100 Mbps. No internet access was observed in 6.2 % of preschool educational organization buildings. The results of calculations based on official statistical data (Information..., 2014–2024) are presented in Figure 4 below.

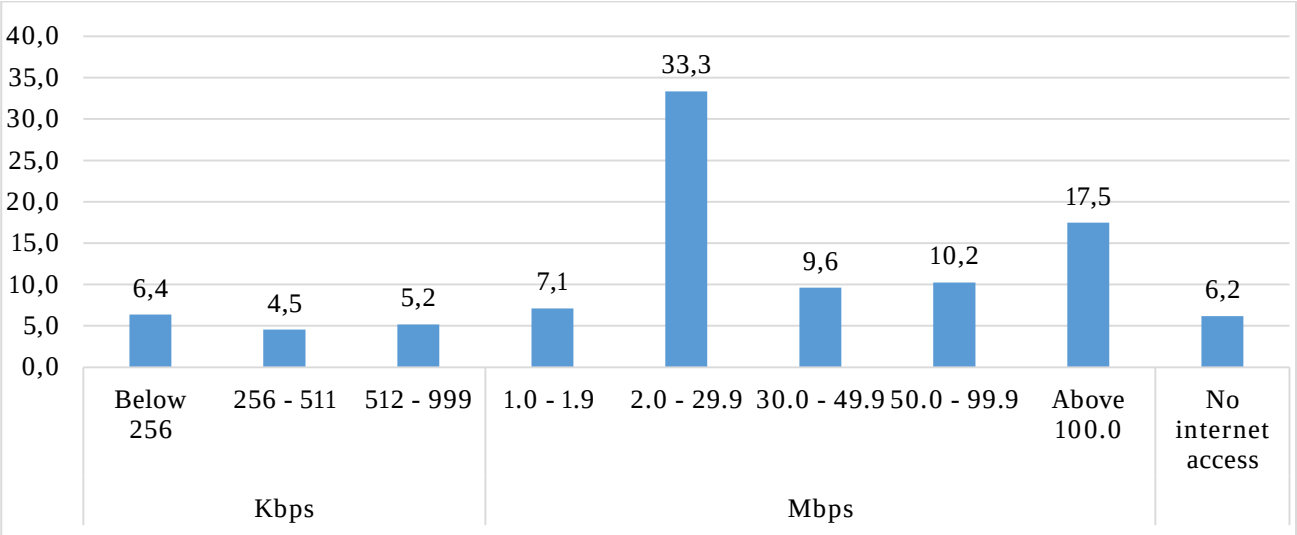

Fig. 4. Distribution of preschool educational organization buildings by internet access speed, 2024, %

Total costs for the implementation and use of digital technologies for preschool educational organizations across the Russian Federation amounted to over 5 billion rubles, with information security products and services costing over 219 million rubles. Internal costs for digital content acquisition amounted to over 44 million rubles.

A recalculation of the costs of implementing and using digital technologies per preschooler showed that they totaled 833.9 rubles per year. Across federal districts, a 3.4-fold discrepancy was recorded between the highest and lowest values.

Preschool educational organization expenditures on information security products and services per preschooler amounted to 34.4 rubles per year; the discrepancy between the highest and lowest values across federal districts was 7.8 times.

The cost of acquiring digital content per preschooler aged 5 years and older amounted to 15.4 rubles per year, with the discrepancy between the highest and lowest values across federal districts being 5.2 times.

5. Conclusion

Thus, in the period from 2014 to 2024, there has been an increase in the availability of computers for teaching staff and preschoolers in preschool educational organizations, and an annual increase in the number of personal computers in preschools, including those connected to the Internet, has been noted.

At the same time, there is differentiation across federal districts and regions in terms of the provision of preschool educational organizations with computers available for use by preschoolers, the share of computers connected to the Internet, and expenditures on the digitalization of preschool education.

Internal expenditures by preschool educational organizations on digital content acquisition per preschooler over 5 years of age remain low, which may indicate limited opportunities for independent selection of necessary additional electronic materials. This process may hinder digital transformation in the preschool education system.

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