THE RUSSIAN ACADEMY OF SCIENCES
MINISTRY OF HEALTH OF THE RUSSIAN FEDERATION
NATIONAL MEDICAL RESEARCH CENTER FOR CHILDREN'S HEALTH
ALL-RUSSIAN SCHOOL DEVELOPMENT SOCIETY
AND UNIVERSITY OF MEDICINE AND HEALTH

# HYGIENE STANDARDS

# AND SPECIAL REQUIREMENTS

# TO DEVICE, CONTENT AND MODES OF OPERATION

# IN THE CONDITIONS OF THE DIGITAL EDUCATIONAL ENVIRONMENT

# IN THE SPHERE OF GENERAL EDUCATION

Moscow ● 2020

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**MEDICINE AND HEALTH**

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# HYGIENE STANDARDS AND SPECIAL REQUIREMENTS TO DEVICE, CONTENT AND MODES OF OPERATION IN THE CONDITIONS OF THE DIGITAL EDUCATIONAL ENVIRONMENT IN THE SPHERE OF GENERAL EDUCATION

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**Organizations - developers:**

1 All-Russian Public Organization “All-Russian Development Society school and university medicine and health "

[2] FSAU "National Medical Research Center for Children's Health"
Ministry of Health of the Russian Federation
[3] FGAOU VO "First Moscow State Medical University named after
THEM. Sechenov "(Sechenov University) of the Ministry of Health of the Russian
Federation
[4] Russian National Committee for Protection against Non-Ionizing Radiation
[5] FSAEI HE "Russian National Research University named after N.I.
Pirogov "of the Ministry of Health of the Russian Federation
[6] State Budgetary Educational Institution of Higher Education North-Western State Medical University named after I.I.
Mechnikov of the Ministry of Health of the Russian Federation
[7] SPb GBUZ "Children's City Polyclinic No. 68"
[8] ILC FSBI "Center for State Sanitary and Epidemiological Surveillance"
Office of the President

**Authors - developers:**
Kuchma V.R. [1,2,3] , Sedova A.S. [1,2] , Stepanova M.I. [1,2] , Barsukova N.K. [1,2] , Alexandrova I.E. [1.2] ,
Aizyatova M.V. [2] , Grigoriev O.A. [4] , Komarov D.B. [4] , Milushkina O. Yu. [1.5] , Morgachev O.V. [2] ,
Petrova N.A. [6] , Polenova M.A. [1,2] , Prokofieva A.S. [4] , Sankov S.V. [3] , Sokolova S.B. [1.2] ,
Tikashkina O.V. [2,3] , Fedotovskaya Yu.I. [7] , Khramtsov P.I. [1,2] , Elksnina E.V. [2] , Yanushanets
O.I. [1.6] , Chekmarev O.M. [8]

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The guidance is based on the results of scientific research carried out in the last
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of Medical Sciences RAS.



**Content**

**Page 5**



**Introduction**

Implementation of educational programs using e-learning and distance learning technologies are enshrined in the Federal Law of 12/29/2012 No. 273-FZ "On education in the Russian Federation." 01.10.2018 was approved the passport of the Federal project "Digital Educational Environment", included to the National Project "Education". The aim of this project is to create conditions to implement a modern and safe digital educational environment by 2024 (DSP), which ensures the formation of values for self-development and self-education in students of educational organizations of all types and levels, by updating information and communication infrastructure, training, creation federal digital platform.

The modern educational process requires a significant expansion of the arsenal teaching aids and the use of electronic educational resources, one of the the main components of which are electronic textbooks developed in currently in all academic subjects at all levels of education. New e-educational content is characterized by different fonts design, information on the monitor screen is presented without taking into account the specifics screen of electronic media and age-related physiological characteristics of the process reading.

In recent years, the informatization of the educational process has sharply increased from use of e-learning tools, which contributed to the deterioration health status of children. Longitudinal observation results indicate growth from grade 1 to grade 11 by 14.7% in the prevalence of functional abnormalities

(from 3283 to 3765 per 1000 people), and chronic diseases - by 52.8% (from 813 to 1242 per 1000 people).[1] Eye diseases, mainly myopia, began to occupy one of the leading places in morbidity structure: over an eleven-year period of schooling, the frequency the incidence of functional visual impairments in schoolchildren has doubled (from 219 to 453 per 1000 people), and chronic diseases - 16 times (from 11 to 170 per 1000 people). In addition, the visual acuity of the majority of students decreased by 0.5-1.0 diopters per a year, and some - up to 2-2.5 diopters. More than 62.0% of school graduates had visual impairment. Also noteworthy is the significant prevalence of among high school students of functional deviations from the mental sphere and nervous system, cardiovascular and musculoskeletal systems.

The main principle of creating a DSP should be to ensure its security for the health of students. Material and technical equipment and information telecommunication and technological infrastructure educational organizations should also be carried out taking into account their impact on the child's body.

Currently, there are no sanitary and epidemiological rules and standards for DSP. However, a number of scientific studies have been accumulated in this area with participation of hygienists. At the Research Institute of Hygiene and Health Protection of Children and Adolescents of the Federal State Autonomous Insti "National Medical Research Center of Children's Health" of the Ministry of Health of Russia is conducting research to substantiate and the development of requirements for the design of electronic content for

[1] Longitudinal study was carried out by specialists from the Research Institute of Hygiene and Health Protection of Children and adolescents FGAU "National Medical Research Center of Children's Health" of the Ministry of Health of Russia in 2005-2018.

**Page 6**



various electronic devices (reader, computer, laptop and tablet). Developed hygienic standards that determine the optimal font sizes and text blocks of electronic publications, corresponding to age characteristics perception, will ensure the creation of safe conditions for visual work and to increase resistance to the development of visual fatigue in children.

The target indicator of the Federal Project "Digital Educational Environment" is by 2024 the introduction of modern digital technologies in educational programs 25% of educational institutions of 75 constituent entities of the Russian Federation for at least 500 thousand children, providing 100% of educational institutions in cities with Internet connection speed of at least 100 Mb / s, in rural areas - 50 Mb / s, creation of a network of digital education centers covering at least 136 thousand children. In this regard, safety assessment becomes relevant. used learners electronic funds learning. Most common and widely used for educational purposes among children and adolescents smartphones cannot provide the reflection of educational information in accordance with hygienic and ophthalmological requirements. The screen diagonal of these devices does not allow to achieve the necessary optimal for visual work parameters of the font design of the content of educational information. With regular and long-term use during training sessions, the smartphone should be considered as a significant risk factor for the development of pathology of the organs of vision in children and adolescents.

To prevent the possible negative impact of training on health and development of the child's body education organizers, teachers should know features of the influence of electronic devices on the functional state, performance and health of the child; comply with hygiene requirements for the device, equipment and content of classrooms in which are used these means, the regime of study and rest of children in the process of education and training with using computer technology.

**1 area of use**

This document establishes hygiene standards and special requirements for the digital educational environment of the school and online education of children in at home, hygienic standards for font design of text

information of educational electronic publications.

The document is intended for heads of executive authorities in the sphere of health protection and education, pedagogical and medical workers, organizations - manufacturers of electronic teaching aids, educational electronic publications, content providers and educational services to educational organizations, Rospotrebnadzor specialists, parents .

**2. Terms and definitions**

*Hygienic requirements for the type design of educational electronic publications* - requirements aimed at ensuring readability of the text in order to preventing the negative impact of the reading process on the reader's health.



*Distance learning technologies (online learning)* - educational technologies implemented mainly with the use of information and telecommunication networks with indirect (at a distance) interaction students and teaching staff.

*Point* size - font size, measured in points (characteristic of font design educational electronic edition).

*A laptop* is a portable personal computer.

*Personal computer* - stationary personal electronic computing machine (PC) - a technical tool capable of performing multiple arithmetic and logical operations based on a given program and data.

*A tablet* is a portable personal computer.

*A point* is a unit of measurement, equal in the Didot system - 0.376 mm. (characteristic type design of the educational electronic edition).

*Digital educational environment* - a set of conditions for implementation educational programs using e-learning, distance educational technologies, taking into account functioning of electronic information and educational environment, including electronic information resources, electronic educational resources, a set information and telecommunication technologies, the respective technological means that ensure the development of students of educational programs in full regardless of the location of the students.

*Font formatting of text* - a set of parameters that determine readability of the edition: type size and capacity, increased leading, length lines, font group.

*The electronic form of the textbook* is an electronic publication corresponding in structure, the content and design of the printed form of the textbook, containing multimedia elements and clickable links that expand and supplement content of the textbook.

*An electronic textbook* is a structured digital document, mainly consisting of from text with contextual search capabilities, which can be thought of as metaphor for a printed book or brochure.

*Electronic Learning Tools (ELE)* - technical learning tools based on electronic principle of action, subdivided by the way of organizing the process training for individual, individual-group and collective, according to the degree interactivity can be without feedback or with feedback, by nature effects on the senses are classified into visual, audio and audiovisual electronic teaching aids; by way of presentation information is subdivided into screen, sound and screen-sound.

*E-learning* - the organization of educational activities using contained in databases and used in the implementation of educational information programs and information technologies providing its processing, technical means, as well as information and telecommunication networks, providing the transmission of the specified information over communication lines, interaction students and teaching staff.

**3. Special requirements for the device, content and modes of operation in the conditions of the digital educational environment in education [2]**

3.1. Requirements for the digital educational environment

3.1.1. The use of e-learning tools (ELE) should carried out subject to their compliance with the Unified Sanitary and Epidemiological and hygienic requirements for products (goods) subject to sanitary epidemiological surveillance (control). Using monitors based on cathode ray tubes are not allowed in educational institutions.

3.1.2. Use wireless data transmission systems in educational organizations to create a local area network, connect to the network Internet, for connecting PC peripherals is not recommended. When using the wireless transmission system, the distance from the WiFi point to the nearest workplace should be at least 5 m. In classrooms, on floors, in detached buildings for primary school students are not installation and use of a wireless data transmission system is allowed, and using a wireless connection of PC peripherals.

3.1.3. Using more than two different ESPs in the classroom (interactive whiteboard and personal computer, interactive whiteboard and tablet) are not allowed.

3.1.4. Smartphones are not allowed for educational purposes (reading, searching for information). Students' use of personal mobile devices communication in the educational organization should be limited, if such a need is not medically conditioned for health. Placing base mobile cellular stations on the territory of educational institutions are not recommended.

3.1.5. The use of laptops by primary school students is possible with an additional keyboard.

3.1.6. When equipping classrooms with an interactive whiteboard (interactive panel), its size and placement should provide students access to the entire surface, no "dead zones" on the board, in which it is impossible work. When developing a project for placing an interactive whiteboard (interactive panels) it is recommended to calculate the zone of optimal visibility. Interactive The blackboard should be centered on the front wall of the classroom. Place your interactive whiteboard on a classroom wall organized using a rail system (it provides a change of interactive and chalkboard when working with students).

3.1.7. Minimum distance from interactive whiteboard (interactive panel) before the first desks there must be at least 2 times the height of the screen, but at least 240 cm. The greatest remoteness of the student's workplace from the interactive whiteboard no more than 860 cm. The height of the bottom edge of the interactive whiteboard (panel) on the floor is 70-90 cm.

3.1.8. The active surface of your interactive whiteboard must be matte. Place your interactive whiteboard projector to prevent glare.

3.1.9. Cabinets (carts) for charging the ESP should not work in the presence of children.

[2] Special requirements are defining

3.1.10. Window openings in rooms where ESP are used should be equipped with dimmable devices / curtains made of opaque fabrics.

3.1.11. The linear dimensions (diagonal) of the ESO screen must correspond hygiene standards.

3.1.12. Organization of workplaces for users of personal computers, laptops and tablets should provide a visual distance to the screen of at least 50 cm. The use of tablets assumes their placement on the table at an angle of 30 ° .

3.1.13. Type design of electronic educational publications should comply with hygiene standards.

3.1.14. Continuous and total duration of use of various ESP in the classroom must comply with hygienic standards.

3.1.15. If necessary, use headphones during their continuous use for all age groups should be no more than an hour. Level volume should not exceed 60% of the maximum. In-ear headphones are intended for individual use only.

3.1.16. The interactive whiteboard (panel) and other ESPs should be turned off or put them into "sleep" mode when their use is suspended or completed, so that the luminous screen is not in the field of view of the students.

3.1.17. The schedule of classes is made taking into account the daily and weekly dynamics mental performance of students and the difficulty of academic subjects.

3.1.18. During the school day of students, including during training classes, it is necessary to include various forms of physical activity (Appendix 1).

3.1.19. In the middle of the lesson, a regulated break is organized for carrying out a set of exercises for the prevention of visual fatigue, increasing the activity of the central nervous system, relieving tension from the muscles of the neck and the shoulder girdle, from the muscles of the trunk, to strengthen the muscles and ligaments of the lower extremities. The exercise complexes are carried out in accordance with Appendix 2, taking into account the prevailing teaching loads and the state of students.

3.1.20. When using electronic equipment, including touch screen, keyboard, computer mouse must be disinfected daily in according to the manufacturer's recommendations either using solutions or alcohol-based wipes containing at least 70% alcohol.

3.2. Requirements for online learning at home

3.2.1. In online learning mode, use a personal computer or laptop provided with a wired Internet connection. When using the wireless transmission system, the distance from the WiFi point to the student's workplace must be at least 5 m.

3.2.2. Using in the classroom more than two different ESPs for one user (personal computer and tablet, laptop and tablet) is not allowed.

3.2.3. Smartphones are not allowed for educational purposes (reading, searching for information).

3.2.4. Place the notebook only on a firm, level surface. The use of laptops by primary school students is possible subject to availability additional keyboard.



3.2.5. The student must be provided with a workplace in accordance with body length. It is recommended to organize the workplace so that the ESP user does not sat with his back to the window.

3.2.6. In the room where the workplace with a computer (laptop) is organized or a tablet, you need not only natural and general artificial lighting, but also local on the desktop. Local light source at the student's workplace should be located to the side of the PC or laptop screen. Lighting should not create

glare on the screen surface. Illumination at the workplace should be at least 300 lx, which can be provided by a lamp with a power of at least 60 watts.

3.2.7. The linear dimensions (diagonal) of the ESO screen must correspond hygiene standards.

3.2.8. Organization of workplaces for PC, laptop and tablet users must provide a visual distance from the monitor of at least 50 cm.

The use of tablets involves placing them on a table at an angle of 30 ° .

Working with a laptop or tablet on your lap, in your hands, lying down is excluded. In field

There should be no bright light sources in the user's eyesight. The monitor should not

with the back to the window. It is undesirable that when working at a computer

daylight from the window was directed into the user's eyes.

3.2.9. Continuous and total duration of use of various ESP in the classroom must comply with hygienic standards.

3.2.10. If necessary, use headphones should be limited to continuous use for all age groups no more than an hour. Optimal

the volume level is 60% of the maximum.

3.2.11. ESPs should be turned off or put into "sleep" mode when they

use is paused or ended so that the glowing screen is not in

field of view of students.

3.2.12. For reading, completing assignments by students of all age groups you should use mainly educational publications on paper.

3.2.13. During and between classes, breaks are organized for prevention visual fatigue, increased activity of the central nervous system, for

relieving tension from the muscles of the neck and shoulder girdle, from the muscles of the neck and shoulder girdle, with

muscles of the trunk, to strengthen the muscles and ligaments of the lower extremities. Complexes

exercises are carried out in accordance with Appendix 2, taking into account the prevailing

training loads and the condition of students.

3.2.14. Before the start of classes and every hour of work, the room in which classes are held, should be ventilated (at least 15 minutes), taking into account the weather climatic conditions, in the presence of children, drafts should be avoided.

3.2.15. The mode of use of electronic devices equipped with a screen during extracurricular time should be based on a "one to three" ratio for students from

6 to 8 years old; for students 9-15 years old - "one to two"; for students over 15 years old -

"One to one" (for example, "one to one" - for every 30 minutes of work - 30 minutes

recreation).

3.2.16. When using electronic equipment, including touch screen, keyboard, computer mouse must be disinfected daily in according to the manufacturer's recommendations either using solutions or alcohol-based wipes containing at least 70% alcohol.



**4. Hygienic standards for the device, content and organization of the regime work in a digital educational environment**

4.1. Requirements for the area of premises

| Premises | Standard (not less than m 2 / person) |
|---|---|
| 4.1.1. Educational organizations - digital schools | |

| Premises | Area (at least) |
|---|---|
| Training rooms equipped with individual workers places with computers, laptops | 4.5 m 2 / person |
| Training rooms equipped with individual workers places with tablets | 2.5 m 2 / person |

4.2. Requirements for equipment of premises

| Equipment type | room furniture | Marking | Body length | Working height surfaces |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Furniture student (tables) | 1 | Orange | body length of children from 100 to 115 cm | 460 mm |
| | 2 | Purple | body length of children from 115 to 130 cm | 520 mm |
| | 3 | Yellow | body length of children from 130 to 145 cm | 580 mm |
| | 4 | Red | body length of children from 145 to 160 cm | 640 mm |
| | five | Green | body length of children from 160 to 175 cm | 700 mm |
| | 6 | Blue | body length of children from 175 cm to 185 cm | 760 mm |
| | 7 | The black | body length of children above 185 cm | 820 mm |

| Equipment type | room furniture | Marking | Body length | Seat height |
|---|---|---|---|---|
| Furniture student (chairs) | 1 | Orange | body length of children from 100 to 115 cm | 260 mm |
| | 2 | Purple | body length of children from 115 to 130 cm | 300 mm |
| | 3 | Yellow | body length of children from 130 to 145 cm | 340 mm |
| | 4 | Red | body length of children from 145 to 160 cm | 380 mm |
| | five | Green | body length of children from 160 to 175 cm | 420 mm |
| | 6 | Blue | body length of children from 175 cm to 185 cm | 460 mm |
| | 7 | The black | body length of children above 185 cm | 500 mm |

**Page 12**



4.3. Hygienic standards for indicators of natural, artificial and combined lighting in classrooms

| | Discharge and subdivision poison viewer Noah work | Working over- ness and plane normers ania KEO and lighting tendencies (G - burning zones- tal, IN - vertical naya) and height plane over floor, m | Daylight KEO e », .% | | Combined lighting KEO e », .% | | Artificial lighting Illumination, E ». Lx | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Premises | | | at the top or combination nnom lighting | at laterally m lighting up nii | at the top or combination nnom lighting | at laterally m lighting up nii | at combined nom lighting just about | from general about | at general lighting up nii | United ny index discomfort ta ugr, not more | coeffficient ent ripples illuminated sti, K », .% no more than » |
| 1 | 2 | 3 | 4 | five | 6 | 7 | 8 | nine | ten | eleven | 12 |
| Educational premises from interactive noah board (panel) | A-2 | Workers tables and desks: G-0.8 | 4.0 | 1.5 | 2.1 | 1.3 | - | - | 300 (500) ** | fourteen | ten |
| | A-1 | Middle boards: B-1.5 G-0.8 | - | - | - | - | - | - | 300 | - | ten |
| Educational premises, in which use Xia individual new ESS | | Screen: IN 1 | 3.5 | 1,2 | 2.1 | 0.7 | 500 | 300 | 400 not more 200 | fourteen | ten |
| | | | - | - | - | - | - | - | | - | - |

Note: Dashes in the table mean that there are no requirements.
** optimal illumination level (recommended)

4.4. Requirements for the schedule of training sessions

4.4.1. Distribution of the difficulty of academic subjects by days of the week for grades 1-4

| Class | Difficulty score range of academic subjects,% [3] | | | | |
|---|---|---|---|---|---|
| | Mon | tue | Wed | th | Fri |
| | | *1st option* [4] | | | |
| 1-4 | 18 or less | 19-20 | 21-24 | 19-20 | 18 or less |
| | | *2nd option* [five] | | | |
| 1-4 | 17 or less | 21-24 | 17-18 | 21-24 | 17 or less |

4.4.2. Distribution of the difficulty of school subjects by days of the week for grades 5-11 with 5 day week

| Class | Difficulty score range of academic subjects,% | | | | |
|---|---|---|---|---|---|
| | Mon | tue | Wed | th | Fri |
| 5-11 | 18 or less | 19-20 | 21-24 | 19-20 | 18 or less |

4.4.3. Distribution of the difficulty of school subjects by days of the week for grades 5-11 with 6 day week

| Class | Difficulty score range of academic subjects, % | | | | | |
|---|---|---|---|---|---|---|
| | Mon | tue | Wed | th | Fri | Sat |
| 5-11 | 15 and less | 17-18 | 19-20 | 17-18 | 14-15 | 14 or less |

[3] The total difficulty of academic subjects for the whole week is taken as 100%. The point load should correspond to the physiological weekly curve of students' mental performance: low level on Monday and Friday with an increase towards the middle of the week (except for the variant with a "light" day, with the highest scores occurring on Tuesday and Thursday).

[4] A gradual increase in the total difficulty of academic subjects by the middle of the week with a gradual decline.

[5] Distribution of difficulty of study subjects with the organization of a light day in the middle of the week

**Page 13**



4.5. Difficulty of academic subjects depending on the level of study [6, 7]

4.5.1. Difficulty scale for primary school subjects

| General education thing | Number of points (grade of difficulty) | | | |
|---|---|---|---|---|
| | 1st class | 2nd grade | 3rd grade | 4th grade |
| art | 1 | 3 | 2 | 1 |
| Foreign language | 3 | 8 | nine | ten |
| Maths | five | 4 | five | 7 |
| Music | 4 | 1 | 1 | 4 |
| The world | 6 | five | 8 | 8 |
| Russian language (mother tongue) | 8 | nine | 7 | nine |
| Technology | 7 | 7 | 3 | 3 |
| Literary reading | 2 | 2 | 6 | five |

4.5.2. Difficulty scale of school subjects for middle grades

| General education thing | Number of points (grade of difficulty) | | | | |
|---|---|---|---|---|---|
| | 5th class | 6th class | 7th class | 8th class | 9th class |
| Algebra | - | - | eleven | ten | ten |
| Biology | 8 | 7 | 8 | 7 | 8 |
| Geography | nine | 8 | five | 3 | five |
| Geometry | - | - | 13 | 13 | 12 |
| art | 2 | 2 | - | - | - |
| Foreign language | 13 | 13 | eleven | eleven | 7 |
| Informatics | 3 | 4 | 3 | 2 | 4 |
| History (History Russia / General History) | eleven | eleven | 7 | 8 | eleven |
| Literature | 6 | five | 6 | five | 3 |
| Maths | ten | ten | - | - | - |
| World art culture (MHC) | - | - | 3 | 1 | 1 |
| Music | 1 | 1 | 1 | - | - |

| | | | | | |
|---|---|---|---|---|---|
| Social Studies | 7 | 7 | five | 7 | 6 |
| Security basics life activity | 1 | 2 | 3 | 3 | 3 |
| Russian language (mother tongue) | 12 | nine | nine | 6 | 7 |
| Technology | 4 | 6 | 4 | 4 | 2 |
| Physics | - | - | ten | nine | fourteen |
| Chemistry | - | - | - | 8 | 13 |

6 The assessment of the difficulty of objects that are absent in the presented scales is carried out in the same way subjects of this subject area.
7 Lessons with a dynamic component (physical education lessons, rhythmics, etc.) are included after most difficult subjects





4.5.3. Difficulty scale for high school subjects (grades 10-11)

| General education thing | Number of points (difficulty rank) | General education subjects | amount points (rank difficulties) |
|---|---|---|---|
| Physics | 12 | Informatics, Economy | 6 |
| Geometry, Chemistry | eleven | History, Social Studies, MHC | five |
| Algebra | ten | Astronomy | 4 |
| Russian language | nine | Geography, Ecology | 3 |
| Literature, Foreign language | 8 | OBZH, Local History | 2 |
| Biology | 7 | | |

4.6. Lesson organization requirement

| 4.6.1. Organization lesson in According to age opportunities and learners | Step learning | Lesson organization indicators: amount species educational activity ty | Maximum new time fulfillment one kind activities, min | Density Lesson 8% | Break for physical education minutes |
|---|---|---|---|---|---|
| | 1-4 classes | 3-7 | 5-7 | 60-80 | Mandatory |
| | 5-9 classes | 5-7 | 7-10 | 70-90 | Mandatory |
| | 10-11 classes | 5-7 | 7-10 | 70-90 | Mandatory |

4.7. Requirement for the placement of interactive whiteboards (panels) in classrooms

| Electronic means learning (EIE) | Stage of study | Visibility angle, in degrees 9 |
|---|---|---|
| interactive board (interactive panel) | 1-4 grades | not less than 45 |
| | 5-11 grades | not less than 35 |

4.8. Screen size requirements for e-learning tools

| Electronic Learning Tools (ELE) | Screen diagonal, inch / cm |
|---|---|
| interactive board (Interactive panel) | not less than 77/195 |
| Personal Computer | not less than 15.6 / 39.6 |
| Notebook | not less than 15.6 / 39.6 |
| The tablet | not less than 10.5 / 26.6 |

[8] Lesson density is the ratio of time spent directly on learning activities to total lesson time, expressed as a percentage.

[9] The angle of sight of the board is the angle that forms between the surface of the board and the line drawn from the edge of the board to the middle of the extreme workplace of the student at the front table in the extreme (most remote) row (defined on the classroom plan).





4.9. Duration of use of e-learning tools

| Electronic facilities learning | Step learning | Duration of using the ESP, no more in lesson [10], min | in total a day in school [11], min | in total on the day at home (including leisure activity), min [12] |
|---|---|---|---|---|
| Interactive board | 1-3 grades | 20 | 80 | - |
| | 4 classes | thirty | 90 | - |
| | 5-9 grades | thirty | one hundred | - |
| | 10-11 grades | thirty | 120 | - |
| Interactive panel | 1-3 grades | ten | thirty | - |
| | 4 classes | 15 | 45 | - |
| | 5-6 grades | 20 | 80 | - |
| | 7-11 grades | 25 | one hundred | - |
| Personal computer | 1-2 classes | 20 | 40 | 80 |
| | 3-4 classes | 25 | 50 | 90 |
| | 5-9 grades | thirty | 60 | 120 |
| | 10-11 grades | 35 | 70 | 170 |
| Notebook | 1-2 classes | 20 | 40 | 80 |
| | 3-4 classes | 25 | 50 | 90 |
| | 5-9 grades | thirty | 60 | 120 |
| | 10-11 grades | thirty | 90 | 150 |
| The tablet | 1-2 classes | ten | thirty | 80 |
| | 3-4 classes | 15 | 45 | 90 |
| | 5-9 grades | 20 | 60 | 120 |
| | 10-11 grades | 20 | 80 | 150 |

**5. Hygienic standards for the type design of text information educational electronic publications**

5.1. Requirements for the design of text information of educational electronic editions are determined by font parameters and design techniques texts depending on the volume of the text for a one-time reading, age user.

5.2. Fonts registration educational electronic editions must comply with the requirements specified in the table.

5.3. For text information in the educational electronic edition is not allowed apply: narrow typeface; italic typeface (except for emphasis text).

5.4. Font size auxiliary elements of alphabetic and numerical formulas must be at least 9 points.

[10] For an interactive whiteboard (panel) - the total time spent on the lesson; for ESP individual use - continuous work time in the lesson

[11] When using 2 or more ESPs, the total time spent working with them at school should not exceed maximum for one of them.

[12] When using 2 or more ESPs, the total time of working with them at home should not exceed maximum for one of them.

5.5. In tables, the font size must be at least 10 points. When withdrawing one or multiple table cells on separate e-pages font size text the cells must contain at least 12 points. Distance between columns of text in the table should be at least 12 mm.

Table - Requirements for the font design of the text

| Classes | Text volume one-time reading, number of signs | Skittle font, items, not less | String length, mm, not less | Font group |
|---|---|---|---|---|
| 1-2 classes | no more than 100 | sixteen | not regulated | chopped |
| | no more than 200 | 18 | 80 | |
| 3-4 classes | no more than 200 | fourteen | not regulated | chopped |
| | no more than 400 | sixteen | 80 | |
| | more than 400 | 18 | 90 | chopped |
| 5-9 grades | no more than 200 | 12 | not regulated | all groups |
| | no more than 400 | fourteen | 50 | all groups |
| | more than 400 | sixteen | 80 | chopped |
| 10-11 grades, professional new education and professional new training | no more than 200 | ten | not regulated | chopped |
| | no more than 400 | 12 | 50 | all groups |
| | more than 400 | fourteen | 80 | all groups |



*Appendix 1*

**Forms of physical activity during the school day**

1. Before the start of the school day, morning exercises are organized. The duration of the gymnastics is 5-7 minutes.

provided:

2. Physical activity required for learners during recess,

- organization active recreation from using kit multifunctional sports and play equipment, including Swedish walls, soft play and sports modules, etc .;

- carrying out outdoor games;

- organization of separate zones (trampoline, climbing wall, etc.), placement outdoor equipment (swing, carousel, rocker, trampoline, climbing wall, etc.).

3. Carrying out morning exercises, outdoor games is given preference.

4. During training sessions, physical culture minutes (FM) are organized, which should be included in the lesson plan.

5. The choice of exercises for FM is determined by the content and duration educational activities (writing, reading, watching videos, working with electronic teaching aids, etc.).

6. The complex of physical exercises and forms of physical activity is teacher together with a physical education teacher and a medical worker educational organization, taking into account the age and gender of children and their state of health.

7. Morning exercises, active rest during recess, FM during the lesson can carried out using school radio, information technology (presentations, videos).

8. To increase motivation, it is recommended to use modern emotionally colored forms of physical activity, using musical accompaniment, which are changed at least 1 time in 2 weeks.

9. Students are not allowed to morning exercises, active changes, complaining about the state of health.

*Appendix 2*

**Recommended exercises for inclusion in exercise minutes (all exercises are performed while standing)**

*Exercises to Prevent Eye Fatigue*

1. Close your eyes tightly for 3-5 s, then open them for 3-5 s. Repeat 3-4 times.
2. Blink quickly for about 5-7 seconds, close your eyes for 5 seconds. Repeat 3-4 times.
3. Slowly raise your eyes up, then lower them down. Repeat 3-4 times.
4. Slowly move your eyes to the right, then to the left. Repeat 3-4 times.
5. Slowly roll your eyes clockwise, then vice versa. Repeat 3-4 times.
6. Complex "20-20-20". After 20 minutes of work using electronic means learning, a pause of 20 seconds is made, during which it is necessary to look at objects, located 6 m (20 ft) or more.
7. Exercises "marked on glass". It is necessary to look at a point on the glass (any close object), then look at a distant distance. Repeat 3-4 times.
8. In the maximum outstretched hand, you must hold a small, better bright, object and look at him carefully. Then you need to slowly bring the object to your nose.

**Page 18**



As soon as the item turns into one bright spot, count to five and slowly take your hand back. Repeat 3-4 times.

9. Tracking with a glance along a given trajectory using ophthalmic simulators, various objects, behind imaginary numbers, letters, lines or moving objects. For the prevention of injuries in the cervical spine ophthalmologic equipment, as well as items used for exercise, must be placed in the frontal plane.

*Exercises to relieve tension in the muscles of the forearm and hands*

1. Squeeze your hands into a fist and hold for 3 s, then unclench and hold for 6 s. Repeat 3-4 times.
2. Circular movements with the hands of the right hand - counterclockwise, left - clockwise arrow. Repeat 3-4 times. Then repeat the movements in the opposite direction. Repeat 3-4 times.
3. Align the palms of the hands vertically and press with the fingers of each other for 3-5 s, then relax. Repeat 3-4 times.
4. Circular movements of the thumbs of the hands - right counterclockwise,

left - clockwise, then - vice versa. Repeat 3-4 times.

5. Align the thumbs of the hands with the other fingers alternately. Repeat 3-4 times.

6. Vigorously shake the hands several times, first raised, then lowered straightened arms.

*Exercises to increase the activity of the central nervous system*

1. Jumping up on two legs 5-7 s.
2. Turn the torso to the right, return to the starting position, then turn to the left, return to starting position. When performing the exercise, the position of the feet (on shoulder level) does not change. Repeat 3-4 times.
3. Turn the torso to the right, return to the starting position, then turn to the left, return to starting position. The position of the legs is not is changing. Repeat 3-4 times.
4. Rotation of the body around the vertical axis clockwise 1 time, then counter clockwise 1 time

*Exercises to relieve tension from the muscles of the neck and shoulder girdle*

1. Take your shoulders back as much as possible, hold the position for 3 s, return to the starting position. Repeat 3-4 times.
2. Raise your shoulders as high as possible, hold the position for 3 s, lower your shoulders down. Repeat 3-4 times.
3. Connect the fingers behind the back, trying to hook them into the lock - the right hand is up, left bottom, then swap hands. Repeat 3-4 times.

*Exercises to relieve tension in the muscles of the forearm and hands*

1. Squeeze your hands into a fist and hold for 3 s, then unclench and hold for 6 s. Repeat 3-4 times.
2. Circular movements with the hands of the right hand - counterclockwise, left - clockwise arrow and then vice versa. Repeat 3-4 times.
3. Align the palms of the hands vertically and press with one hand on the fingers the other for 3-5 seconds, then relax. Repeat 3-4 times.

**Page 19**



4. Circular movements of the thumbs of the hands - right counterclockwise, left - clockwise, then - vice versa. Repeat 3-4 times.
5. Align the thumbs of the hands with the other fingers alternately. Repeat 3-4 times.
6. Vigorously shake hands several times.

*Exercises to relieve tension from the muscles of the trunk*

1. Raise your arms up, stretch, hold the position for 3 s, lower your arms down. Repeat 3-4 times.
2. Place your hands on your belt with your thumbs in front and your palms behind. Bend back as much as possible, return to starting position. Repeat 3-4 times.
3. Put your feet shoulder-width apart, arms along the body. Perform smooth slopes to the right, then to the left, sliding your hands along your legs. Repeat 3-4 times.

*Exercises to strengthen the muscles and ligaments of the lower extremities*

1. To rise on the toes of both legs, return to the starting position. Repeat 3-4 times.
2. Put your right foot forward without lifting your heels off the floor, then pull as much as possible toe the feet towards you and return to the starting position. Repeat 3-4 times. Also exercise for the left leg.
3. Rolls from heel to toe with two feet at the same time, then - from toe to heel. Repeat 3-4 times.

**List of literature, legislative and regulatory documents**


1. Federal Law of December 29, 2012 No. 273-FZ "On Education in the Russian Federation". The document is provided by the Garant legal information system. Available at: http://www.garant.ru. Date of saving: 05/17/2020
2. Federal project "Digital educational environment" included in the National project "Education". Available at: https://edu.gov.ru/national-project / Date of saving: 05/17/2020
3. Order of the Ministry of Education and Science of the Russian Federation of August 23, 2017 No. 816 "On approval The procedure for application by organizations carrying out educational activities, e-learning, distance learning technologies in the implementation educational programs ". The document is provided by the system of information and legal security guarantor. Available at: http://ivo.garant.ru/#/document/71770012/paragraph/1 0 . date save: 05/17/2020
4. Alexandrova I.E. Hygienic assessment of the curriculum in a digital environment school environment. Public health and habitat. 2018; 3 (300): 15-17.
5. Vyatleva O.A. Impact of smartphone use on well-being, cognitive function and morphofunctional state of the central nervous system in children and adolescents (literature review. Issues of school and university medicine and health. 2020; 1: 4-eleven.
6. Hygienic requirements for the type design of educational electronic publications, presented on a laptop and tablet. Methodical recommendations / Ed. Kuchma V.R., Sankov S.V., Barsukova N.K., Elksnina E.V. Moscow: National Medical Research Center of Children's Health of the Ministry of Health of Russia, 2020.14 p.
7. Grigoriev Yu.G., Samoilov A.S., Bushmanov A.Yu., Khorseva N.I. Mobile communications and health children: the problem of the third millennium. Medical Radiology and Radiation safety. 2017. Volume 62. No. 2: 39-46.
8. Kondakov A.M., Vavilova A.A., Grigoriev S.G. and others. Improvement concept (modernization) of a unified educational information environment that provides implementation of national development strategies of the Russian Federation. Pedagogy. 2018; 4: 98-125.
9. Kuchma V.R. Challenges of the XXI century: hygienic safety of children in a changing environment (part I). Questions of school and university medicine and health. 2016; 3; 4-22.
10. Kuchma V.R. Hygiene of children and adolescents: population and personalized provision sanitary and epidemiological well-being of the child population in modern conditions.

Hygiene and sanitation. 2019.Vol. 98; 1: 61-67.

11. Kuchma V.R. Hygienic safety of hyperinformatization of children's vital functions. Hygiene and sanitation. 2017.Vol. 96.No. 11.P. 1059-1063.

12 Kuchma VR, Sankov SV, Barsukov NK . Hygienic evaluation of type electronic texts presented on a laptop. Hygiene and sanitation. 20 1402-1407.

13. Kuchma V.R., Sedova A.S., Stepanova M.I., Rapoport I.K., Polenova M.A., Sokolova S.B., Alexandrova I.E., Chubarovsky V.V. Features of life and well-being children and adolescents studying remotely during the novel coronavirus epidemic COVID-19 infections. Questions of school and university medicine and health. 2020; 2: 4-19.

14. Kuchma V.R., Stepanova M.I., Sazanyuk Z.I., Polenova M.A., Alexandrova I.E., Berezina N.O., Makarova A.Yu. Hygienic assessment of the impact of training sessions using electronic tablets for the functional state of students. Sechenov Bulletin. 2015; 3 (21): 35-42.

**Page 21**



15. Kuchma V.R., Sukhareva L.M., Barsukova N.K., Stepanova M.I., Polenova M.A., Dadonova A.Ya., Elksnina E.V. Hygienic characteristics of electronic educational resources for students of grades 1-9 ("Mobile electronic school"). School and university medicine and health. 2018; 2: 21-25.

16. Kuchma V.R., Sukhareva L.M., Stepanova M.I., Khramtsov P.I., Aleksandrova I.E., Sokolova S.B. H cientific children in the "Digital school ". I

17. Kuchma V.R. children in a digital environment. Public health and habitat. 2016; 8 (281): 4-7.

18. Kuchma V.R., Teksheva L.M., Kurgan A.M., Petrenko A.O. Hygiene assessment the use of readers in primary school. Hygiene and sanitation. 2014; 3: 57-60.

19. Kuchma V.R., Teksheva L.M., Milushkina O.Yu. Methodical approaches to hygienic classification of technical teaching aids. Hygiene and sanitation. 2008; 3: 53-56.

20. Kuchma V.R., Tkachuk E.A. Assessment of the impact on children of informatization of education and upbringing in modern conditions. Russian Pediatric Journal, 2015; 6: 20-24.

21. Makarova L.V., Lukyanets G.N., Paranicheva T.M., Tyurina E.V. Influence of computer load on the state of physiological functions in children 7-10 years old. Human physiology, 2017, volume 43, no. 2, p. 66-73.

22. Polenova M.A. Information and educational loads as a health risk factor schoolchildren. Public health and habitat. 2015; 10: 20-22

23. Rapoport I.K., Sukhareva L.M. Eleven-year longitudinal follow-up: the prevalence and course of functional abnormalities and chronic diseases in Moscow schoolchildren. Questions of school and university medicine and health. 2019; 1: 19-27.

24. Sedova A.S. Hygienic assessment of the dynamic component of the curriculum. Public health and habitat. 2015; 8: 27-29.

25. Soldatova G.U., Rasskazova E.I. The downside of digital competence of Russian adolescents: the illusion of competence and online risky behavior. Questions psychology. 2017; 3: 3-15.

26. Stepanova M.I. Hygienic safety of digital educational environment for children and adolescents. Pedagogy. 2018; 12: 38–46

27. Stepanova M.I., Alexandrova I.E., Sazanyuk Z.I. etc. Hygienic regulation use of electronic educational resources in a modern school. Hygiene and sanitation. 2015; 7: 64-68.

28. Stepanova M.I., Berezina N.O., Polenova M.A., Alexandrova I.E. Assessment of well-being schoolchildren in class using interactive panels. Questions school and university medicine and health. 2020; 1: 22-27.

29. Stepanova M.I., Sazanyuk Z.I., Alexandrovna I.E. and other Hygienic aspects using a laptop in teaching younger students. School and university medicine and health. 2012; 1: 47-50.

30. Khramtsov P.I. Physiological and hygienic prerequisites for improving health-preserving the effectiveness of physical education of children in educational institutions. Questions school and university medicine and health. 2017; 4: 15-20.

31. Chubarovsky V.V., Labuteva I.S., Kuchma V.R. Borderline mental disorders in studying adolescents: prevalence, risk factors, psychohygiene basics. Russian Pediatric Journal. 2018; 21 (3): 161-167.