

Analysis

Biology Studies in Russian Schools

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Abstract

This article describes the legal framework for the organization of education in Russia. It explains the set-up of general (school) studies in Biology and lists the topics studied in school subjects The World Around Us (1st-4th grade) and Biology (5th-11th grade). Russian system of education gives a lot of focus to the development of methodological knowledge and skills necessary to independently solve cognitive tasks and carry out independent research.

Keywords: *Biology education, integrated school subject the World Around Us, school subject Biology, stages of general biology education, model curriculum, topics (fields) of study.*

Federal Law “On Education in the Russian Federation” that sets legal, organizational and economic framework for the system of education in Russia entered into force on 1st September 2013. This date marks the beginning of the current stage in the development of the education system in Russia. In accordance with the Law mandatory requirements to each stage of education are set in the State Federal Education Standards (hereinafter “the Standard”).

The Standard sets general requirements that are further specified by the Model Curriculum. The Curriculum determines the fields of study, the requirements for learning outcomes as well as certain conditions for educational activities. The Model Curriculum includes a Model Plan of Study, Model Lesson Plans for each school subject and other academic and methodological documents. Model Lesson Plans include a list of generalized topics (‘teaching units’) that all educational institutions (schools) are required to teach. Model Lesson Plans do not set the order in which the topics should be studied or the amount of classroom hours for each topic. The exact list of school topics, the amount of time allocated to each topic, the order of their study and their allocation throughout the school year are determined in the Model Plan of Study.

Based on the Standard and the Model Curriculum academics develop individual copyright curricula and write textbooks and teaching/study aids for pupils and teachers. There can be several such curricula for each subject. Currently Russian schools use 60 different textbooks for Biology (5th-9th grade). Teachers and parents can choose curricula and textbooks. Chart 1 summarizes the principles described above (Chart 1).

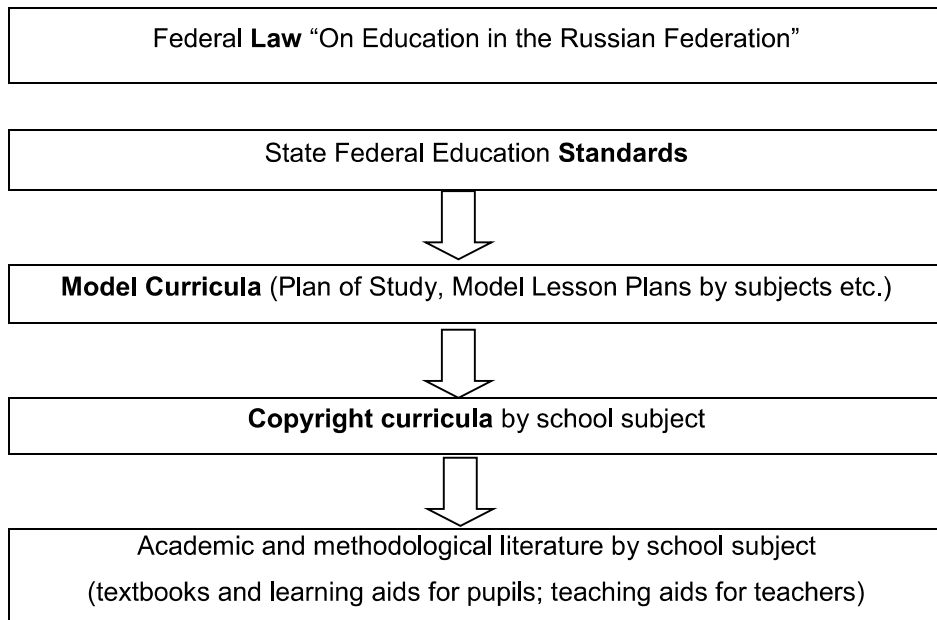


Chart 1. Legal and Regulatory framework of the Education system in Russia.

School-level education in Russia is referred to as 'general education'. Its aim is to ensure that pupils acquire knowledge, skills, moral and ethical principles, which are necessary for their life in contemporary society.

General education starts for pupils who are 6.5 – 7 years old. A school year lasts for 34 weeks (from September to May). School classes or lessons/the usual form of training sessions, last for 35 minutes (during the first year of education), and for 45 minutes (2nd-11th grade).

General (school) education is divided into three stages: primary, basic and secondary; the stages last four, five and two years respectively (Table 1). General (school) education is compulsory in Russia.

Table 1. General (School) Education in Russia.

Education level	Years of school training	Grades
Primary general education (primary school)	4 years	1st-4th
Basic general education (basic/lower-secondary school)	5 years	5th-9th
Secondary general education (secondary school)	2 years	10th-11th

Stages of general (school) Biology training correspond to the three education levels above: stage 1 (preliminary training), stage 2 (general training) and stage 3 (specialized training) (Table 2).

Table 2. Stages of School Biology Education

Level of school education	Level of Biology education	School Subject
Primary (1st-4th grade)	Preliminary	<i>The World Around Us</i>
Basic (5th – 9th grade)	Basic	<i>Biology</i>
Secondary (10th-11th grade)	Specialized	<i>Biology</i> (basic or in-depth study)

Preliminary stage in biology education covers from 1st to 4th grade (primary school education), when two lessons (classroom hours) a week are allocated to the school subject *the World Around Us*. There are 270 classroom hours during four years of study in total (Table 3).

Table 3. Classroom hours allocated to school subject “the World Around Us”

subject \ grade	Classroom hours per year (week)				Total
	I	II	III	IV	
<i>The World Around Us</i>	66 (2)	68 (2)	68 (2)	68 (2)	270

The World Around Us is an integrated subject about the environment and human society. During the course, in grades 1-4, pupils have to acquire knowledge about the integration and the differences between the environmental and social systems, about the role of human kind in the environment and the interaction between an individual and the society as well as about the culture and history of Russia. The Model Curriculum of *The World Around Us* covers the following sections: *Humankind and Nature*, *Individual and Society* and *General Safety Rules*. Biology aspects of the course are taught under sections *Humankind and Nature* and *General Safety Rules*. Section *Individual and Society* teaches about the society, state and history of Russia.

Section *Humankind and Nature* includes the following Biology topics (academic units): nature, plants, mushrooms, animals, ecosystems (forest, meadow, waterbody etc.), natural regions in Russia, human kind as part of the environment, positive and negative im-

pect of the human activities on the environment as well as general information about the human anatomy.

Section *General Safety Rules* covers the following Biology-related topics: the importance of health and healthy life style, daily schedule for pupils, personal hygiene, first aid for minor injuries (bruises, cuts, burns), chilblains, heat exposure; safety rules during an outing; care for health and safety of other people.

The integrated subject *World Around Us* forms the basis for science and social studies (5th- 9th grade) of the basic general education (covered by school subjects Biology, Geography, Physics, Astronomy, Chemistry and Social Studies).

The basic level of Biology studies in school corresponds with the basic stage of general education. The aim of the basic Biology course is to provide some general knowledge in biology and environmental studies, develop the understanding of the uniqueness of nature, natural diversity and evolution, form an idea of an individual as a biological and societal being as well as provide some related practical skills. Pupils (5th- 9th grade) study the subject 'Biology'. Table 4 shows classroom hours per year (week) allocated to Biology studies (Table 4).

Table 4. Classroom hours per year (week) allocated to Biology studies

subject grade	Classroom hours per year (week)					Total
	V	VI	VII	VIII	XI	
<i>Biology</i>	35 (1)	35 (1)	35 (1)	70 (2)	70 (2)	245

Model Curriculum of Biology studies for basic general education covers the following sections: *Living Organisms*, *Human Health* and *General Biological Laws*. Section *Living Organisms* includes the following topics (academic units): Biology as the study of living organisms, organic cells, diversity of organisms, living environments, kingdom Plantae, organs of flowering plants, plants under microscope, lifecycle of flowering plants, diversity of plants, Bacteria, Fungi, Animalia, Single-Celled Organisms, Coelenterata, Worms, Mollusca, Arthropods and Chordate.

Human Health section covers such topics as introduction to studies of the human anatomy, general characteristics of the human organism, neurohumoral regulation, musculoskeletal system, blood and blood circulation, respiratory system, digestive system, metabolism, excretory system, reproduction and development, sensory receptors, higher nervous function and human health and healthcare.

Section *General Biology Laws* covers the following topics: Biology as a science, cell, organism, species and ecosystem.

Specialized studies are carried out at the stage of secondary general education (tenth-grade and eleventh-grade). Specialized studies in Biology are not compulsory, and can be chosen as an optional subject. Depending on the preferred specialization, general or more in-depth studies can be opted for. Table 5 shows classroom hours per year (week) allocated to general and in-depth Biology studies (Table 5).

Table 5. Classroom Hours Allocated to Biology Studies in Grades 10 and 11.

subject \ grade	Classroom hours per year (week)		Total
	X	XI	
<i>Biology (general)</i>	35 (1)	35 (1)	70
<i>Biology (in depth)</i>	105 (3)	105 (3)	210

General Biology studies are more universal, while in-depth studies offer a natural-science approach. Both types of studies cover the same topics (academic units): Biology as complex studies of nature and the environment, structural and functional basis of life, organism, evolution theory, origin and development of life on Earth, organisms and their environment. In-depth study offers a more detailed study of each topic.

General studies in Biology provide knowledge about biological systems (cell, organism, species, ecosystem); history of modern ideas about the environment and nature, outstanding discoveries in biology and role of Biology in the natural science approach to the universe.

In-depth course of Biology teaches about main Biology theories, ideas and principles, about methods used in biological studies (cytology, genetics, artificial selection, biotechnologies and ecology); about the structure, diversity and specific features of biological systems (cell, organism, population, species, ecosystem, biosphere), outstanding biological discoveries and modern biology studies. The aim of in-depth course is to prepare schoolchildren for professional education.

Russian and international best practices in pedagogic assessment, surveys and monitoring are used for education quality assessment. The final quality assessment of basic general education is the Basic State Examination (BSE or OGE). The final quality assessment for secondary general education is the Unified State Exam (USE or EGE). Final tests are an important part of the education process.

For many years, Russia has been a participant in international studies in order to ensure an objective evaluation of education quality in comparison to other countries. An international project *Progress in International Reading Literacy Study (PIRLS)* helps evaluate reading and comprehension skills of primary school children. A study called *Trends in Mathematics and Science Study (TIMSS)* provides comparative assessment of mathematics and natural science skills of children in 8 year of school. *Program for International Student Assessment: Monitoring Knowledge and Skills in the New Millennium (PISA)* tests measure the ability of pupils (15 years old) to use the knowledge and skills they have acquired in everyday life.

The participation of Russian pupils in international studies is analyzed so that Standards, Model Curricula, textbooks and teaching aids can be amended and improved as required in order to improve the quality of education. Russian system of education gives a lot of focus to the development of methodological knowledge and skills necessary to independently solve cognitive tasks and carry out independent research. Quality of general education is considered a crucial condition for personal accomplishment in adult life.

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