

# Do Modern Russian Schools Provide Education or Training?

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**Abstract**— The concepts of “education” and “training” are sometimes considered synonymous. However, it is not true, as education is a result of training always requiring systematization of the acquired knowledge. Students of non-chemical schools have not been receiving education in chemistry in the course of training in chemistry for a long time already. The reason is poorly thought-out reforms of the educational system taking place for the last 10–15 years. The lack of sufficient chemistry education prevents students from mastering chemistry in higher educational institutions. The situation is aggravated by the transition of higher educational institutions to a two-step “bachelor–master” system.

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The Russian Federation is not and never will be a member of the European Union. Moreover, Russia is not a member of the European Education Commission. Why should Russian universities follow Western programs and prepare specialists for the European labor market? Even for this purpose, there is no need to accept the terms of the Bologna Declaration of 1999 and the earlier Sorbonne Declaration of 1998. Russia can help European countries to develop rational modern educational programs on the basis of its successful engineering experience.

The concepts of “education” and “training” are sometimes considered synonymous. However, if we refer to exact definitions, for example, given by “The Explanatory Dictionary of the Russian Language” [1], we can see the difference. The dictionary offers two interpretations for the concept of “education.”

According to the first one, education is acquisition of systematic knowledge and skills.

According to the second one, education is a set of knowledge acquired as a result of training.

Consequently, education is what a person gets as a result of training accompanied by systematization of the acquired knowledge, skills, and abilities, which means that simply to acquire knowledge, skills, and abilities is not enough. Education is formed as a consequence of mastering knowledge, skills, and

abilities as a result of work both of students themselves and teachers transferring a set of knowledge. Only in this case a secondary general school graduate can be considered an educated person.

Let us once more turn to the dictionary [1], “educated person – a person having acquired education, a person having education, and a person possessing versatile knowledge.” Let us pay attention to the fact that it is not a person who has mastered knowledge, skills, and abilities, but a person who has acquired education based on versatile knowledge.

Many people, especially parents who do not work as teachers, are of the opinion that it does not matter what it is their children acquire at school. In the end, they receive their certificates of secondary education. Yes, the final document received by graduates upon completion of a secondary school is called this way. The question is whether school children have really received education or they have only been trained in various school subjects. To feel the deep difference between the concepts of “training” and “education” let us consider the difference between the corresponding adjectives “trained” and “educated,” taking the Army as an example.

In an ideal army a broadly educated officer commands well-trained soldiers, which is right. If we interchange the adjectives, we will have “a trained

officer” and “an educated soldier.” It is a rare case when a slightly trained officer commands highly educated soldiers, who have graduated from a university or, let us say, a conservatory of music (such things also happen). Such word combinations as “a trained soldier” and “an educated officer” all the same seem more traditional and, in a certain sense, more “safe.”

School children attending ordinary schools and studying in grades that do not specialize in chemistry have received no chemistry education or, more precisely, no chemistry education within the framework of the school discipline of chemistry for a long time already. A steady decline in the level of training of secondary school graduates in chemistry (according to the results of entrance tests at higher educational institutions) has been observed for several years [2]. It is common practice to seek the reasons for this decline in the latest reforms of the educational system, involving a reduction in the number of hours allocated to study this school subject, introduction of the Unified State Examination (USE), humanization of the educational process etc. Of course, the listed innovations could not but affect the quality of school graduates’ training; however, we need to look deeper to find the main reason.

Many years of experience in teaching in secondary and higher educational institutions allow us to talk about the current situation in Russian education, created by the reformers who changed the state of things not for the better at all. Let us identify the factors that in our opinion are determinative among numerous new developments in this sphere.

(1) Specialization in senior secondary school years, which was not sufficiently supported by experience and which in practice resulted in imbalanced secondary school training.

(2) Adoption of “The Law on Universal Secondary Education,” which did not pass a comprehensive expert evaluation and which, figuratively speaking, turned a secondary school into a sort of storage room for children.

(3) A poorly thought-out introduction of the Unified State Examination, replacing tutoring services provided by teachers of higher educational institutions, who trained applicants specifically for admission to higher educational institutions, with frequent corruption among secondary school teachers training future school graduates for the USE.

(4) Hasty copying of the European experience of transition of higher educational institutions to the training principles of the Bologna Declaration without establishing the corresponding basis.

The first of the above-listed reasons follows from “The Concept for Modernization of Russian Education until 2010,” which by now has almost completed action. The Concept consisted of:

- an attempt to introduce 12-year training,
- new, continuously updated standards,
- specialization in senior years of secondary school education, and
- introduction of the USE as the panacea for all ills of the Soviet school system.

Implementation of these initiatives of the Concept created a new educational space that is fundamentally different from the Soviet system in secondary general schools. Conditions for teaching of all subjects changed radically. As a result, such subjects of the natural science cycle as mathematics, physics, chemistry, and biology “suffered” a great deal.

The verb “suffered” that we have used in this context requires special interpretation. If a class or, even better, an entire school became specialized in the above-mentioned subjects, the set objective was at least partially achieved, i.e. specialization subjects were given priority; however, in the majority of cases it was done at the expense of other subjects. For example, in senior grades with specialization in physics and mathematics the number of hours allocated to such an important subject for the full secondary education foundation as chemistry amounts to only one (!) hour per week! Under these circumstances, it has simply become impossible to study this subject normally, at the level of the former standards.

Therefore, it was necessary to urgently create a generation of new standards. In this situation, in an attempt to force new knowledge fit into the reduced time resource the traditional well-proved fundamentals were almost completely forgotten. These important ideas were discovered and thoroughly elaborated in the works of such classical scientists of Russian pedagogy as V.N. Verkhovskii, A.D. Smirnov, S.G. Shapovalenko, Yu.V. Khodakov, L.A. Tsvetkov, D.M. Kiryushkin, G.P. Khomchenko, and others. The pedagogical principles of teaching chemistry in secondary school, which significantly exceed the

Western approach, have always formed the basis of the Russian secondary school methodology.

In an effort to “modernize” the school chemistry discipline, sections that are incomprehensible for the eighth-grade school children are included into the chemistry course from the very first steps of learning. Chemistry is an experimental and theoretical science and without “feeling” substances it is impossible to understand its logic. School children should not start their acquaintance with chemistry from profound abstractions, although, they may be exceptionally important. For example, such topic as the atom structure is moved from the second year of study to the first quarter of the first year; furthermore, electrolytic dissociation, which used to be presented in the third year of learning chemistry, is now given as early as in the second quarter of the first year. It would seem that this logic is clear and simple, as properties of substances are studied on the basis of their structure. However, the problem is that these and other multicomponent sections, which include different complex concepts, are not even studied; this material is “covered” by school children, who do not really learn it.

For the last half a century the mentality of young people has not changed despite the progress of applied electronic manuals. The rates of learning training materials related to age mentality remain the same. Research works carried out by the above-mentioned scientists in pedagogy made it possible to thoroughly select and structure the content of the school chemistry course in compliance with age characteristics of school children and with their intellectual abilities. It is these processes that were studied, mastered, and taken into account by methodologists in compiling textbooks. However, now, contrary to pedagogical common sense, difficult theoretical material has been moved to the beginning of the school chemistry course.

What do we have as a result of such teaching? Even if experienced teachers manage to present all the required material within one hour allocated to chemistry, they will have to think not about their pupils’ education, but about inspections and inspectors, which will evaluate their work not on merits but on formal grounds of school children’s training, but not education. Even if knowledge, skills, and abilities are put into practice, they do not form a single view of world of chemical phenomena, do not create an image of chemistry, and, therefore, cannot provide education in chemistry.

Today, a meta-subject approach, which is intended to ensure a transition from the existing practice of fragmentation of knowledge into separate subjects to holistic vision of the world, is being implemented. Now schools face a task not to form knowledge and skills, but to develop school children. It is hard to imagine how it is possible to develop anyone without well-established knowledge. With the appearance of meta-subjects an even greater decline in natural science literacy should be expected. It took the mankind several millennia to identify separate subject areas of knowledge. To study them with more success it is necessary to develop intra-subject logical thinking, which is characteristic of every school discipline (such is the aim of repetition, to perform which, as a rule, there is not enough training time). It requires efforts of teachers to develop associative logical thinking, at the basis of which knowledge in separate subjects can integrate into one whole. It is these abilities that school graduates need in order to be able to expand and deepen the formed picture of the world in the course of studying natural sciences in higher educational institutions.

It is necessary to take a sober look at the situation, to evaluate it rather critically, and to imagine the role and the work of the chemistry teacher under the current school conditions from an absolutely different point of view. The teacher’s work should be evaluated not on formal grounds, but based on the progress in the development of each pupil, either good or bad, for the period of studying chemistry. School children, who are going to expand their education at the higher school level and apply to technical higher educational institutions that do not specialize in chemistry, have to take an examination in chemistry, which will be a guarantee not only of their level of training but education in chemistry.

Entrance chemistry tests conducted by higher educational institutions give discouraging results. The level of chemistry knowledge among school graduates applying to non-chemistry higher educational institutions, including technical, pedagogical, agricultural institutions, and the like, does not allow them to start studying a chemistry course provided by higher educational institutions without difficulty. It would seem that so many years of reformation should cause some positive shift. However, negative results are surprisingly stable. Year after year the situation does not improve. How in this case will students be able to acquire knowledge that is necessary to understand at least the basics of nanochemistry and nanotechnology?

The problem of increasing the level of chemistry knowledge among school graduates applying to higher educational institutions is a subject of discussion at every conference of higher school teachers. One of the made suggestions concerning the evaluation of the level of knowledge that can give the greatest effect is to compel the applicants to technical institutions of higher education to provide their USE results in chemistry. These data should not be taken into account in competitive selection (like the USE results in the Russian language); however, introduction of this requirement will give a triple effect. Firstly, specialized schools will stop neglecting this subject and taking away school hours allocated to the discipline of chemistry. Secondly, the minimum knowledge in chemistry acquired in school and confirmed by the USE will help entrants to higher educational institutions to study a difficult course of chemistry given by technical institutions of higher education. Thirdly, the requirement to provide the USE results in chemistry will increase understanding of the value of chemistry knowledge among those who are at present far from respecting chemistry. After all, the majority of school graduates maintain the level of chemistry knowledge acquired in secondary school for the rest of their lives.

While secondary school education, undoubtedly, required reformation at least because of its ideological “blindness,” higher education did not need that. It was especially true for technical higher educational institutions, as the Russian engineering expertise was ahead of the Western European level. Our greatest breakaway from Europe was to be found in such areas as nuclear power, space and missile research, military and industrial developments, and the related sectors of economy. Engineers leaving the country were in demand in European countries and rarely came back.

Secondary education, including secondary special education, weakened by material insecurity of schools and a lack of modern equipment (remember the beginning of computerization), as well as low salaries of school teachers, has already started falling apart, whereas higher education still persisted, producing good specialists in engineering. Everything changed after in 2003 Russia joined the “Joint Declaration of the European Ministers of Education Convened in Bologna on the 19th of June 1999.” We should pay attention to the fact that the Declaration was signed not by the heads of states and even not by the heads of governments, but by “ordinary” ministers of education,

as the document did not pursue global objectives, but was only aimed to establish the educational system standard. The objective of the Declarations was to ensure the most complete dissemination of knowledge and training of specialists for the European labor market which has become unified. It is the European, not the Russian labor market!

The Russian Federation, which is not a member of the European Union, cannot be found on the web-site of the European Commission for Education. Neither can it be found among the participants of such special programs as PLOTEUS [3] and EUROPASS [4], which are aimed to create a single European educational space. Then why should Russian school follow the Western programs?

Both the Bologna Declaration (1999) and the earlier Sorbonne Declaration (1998) are aimed to ensure compliance of qualifications acquired in higher educational institutions with the demands of the European labor market. The problem of many European countries is the duration of education, especially during the first stage (bachelor programs), and a large number of half-educated people, who have dropped out of educational institutions and failed to find a job. It is for these people that well-planned and efficient programs have to shorten the general duration of education, reduce the number of students dropping out of studies without acquiring any qualification, and contribute to employability of such specialists on the labor market. What do we need all this for?

Our higher educational institutions have always produced engineers. All their curricula are aimed to train specialists and to satisfy the needs of production. As for students, who for one reason or another failed to acquire full higher education, in no way did they fill the gaps of the European labor market, but found jobs in the Russian production industry. Russian five- and six-year programs of training, at the completion of which and after defending a thesis graduates receive a qualification of “specialist in engineering,” are in full compliance with the main objectives set by the European reform of education in accordance with the Sorbonne and Bologna Declarations. In all documents of the European Union, related to the reform of education, the main emphasis is made on employability of graduates of higher educational institutions in European countries. If the objective of the reforms that are shaking us is to train specialists for the European market, then such efforts will lead to a fact that well-educated masters will leave Russia for

Europe, whereas half-educated bachelors will stay in Russia.

With great difficulty and only in certain specialties some higher educational institutions have managed to “defend” their specialization and continue training specialists in engineering. They have found support in the form of examples of the leading technical educational institutions of Germany, France, and other countries, which have not followed the Bologna Declaration but continue producing engineers as they used to. Depriving itself of specialists in engineering, Russia will immediately start losing to these countries in technical development. With great difficulty it has been made clear that certain specialties, for example, in the military sphere, are not a place for bachelors.

A permission to train engineers has been obtained under the following conditions: every time the list of specialties within the framework of which engineers are trained has to be approved by a Resolution of the Government and in no other way! It is a strange paradox. The Bologna Declaration was signed by European ministers of education who acted within the scope of their powers without breaking the Magna Charta Universitatum of 1988 [6], which said, “The university is an autonomous institution at the heart of societies.” Only in Russia the Ministry of Education and Science, supported by the Government, continues declaring the production of bachelors for unknown purposes. Although, we already know [5] the disappointing statistics of bachelors’ employment on the Russian labor market, according to which for the last five years only 5% of bachelors have started working in compliance with their specialty. At the same time, the percentage of specialists in engineering, who find relevant employment, ranges from 45 to 75% of the number of graduates of corresponding higher educational institutions.

In order to force the specialist’s knowledge fit into a Procrustean bed of bachelor programs, the reformers are trying to distribute the number of credits (hours) among the disciplines included into the bachelor program format. Academic hours allocated to such disciplines as mathematics, physics, chemistry etc., which form the fundamental component of higher education, are curtailed. Taking into account the unfavorable situation with secondary education and the necessity to eliminate the defects of this education in the course of study in higher educational institutions, it is possible to talk about double damage.

If we admit that the main goal of the Russian educational system is to train specialists for Europe, the poorly thought-out introduction of the “bachelor–master” system is well-justified. In any other case, this work is against the Russian people and their interests. The Russian system of higher education, which has existed for many centuries and which has received recognition abroad many times, is in full compliance with the requirements, principles, and objectives of the Sorbonne and Bologna Declarations. Russia itself can help Europe to form rational modern educational programs on the basis of its successful experience in engineering education.

This year is the second year of experimental transition of the Bauman Moscow State Technical University to the two-level system of education. As a result of the reduction in the learning scope of mathematics by 10%, physics by 30%, and chemistry by 40%, the general academic performance has decreased by 10–15%. Moreover, there has been a reduction in the number of students with top grades (“excellent” and “good”). However, the number of students, who cannot cope with the learning load and whom the Bologna system is allegedly intended to meet halfway, has not decreased. Thus, the module-rating system, developed in compliance with the principles of the two-level “bachelor–master” system of training, produces “half progressing” students, for whom the objective of education is not to acquire knowledge, but to get a conflict-free “satisfactory” grade. In this case, credit points are obtained as a result of summing the grades for written certification modules, which are evaluated under conditions of almost complete elimination of contact with the teacher. Teaching becomes a craft of training students, without creating a general picture of the discipline, the learning of which the process is intended to ensure.

To receive training is a necessary but far from sufficient condition of education. Trained people are easy to control, as they do not see the prospects. However, it is pointless to expect them to make a breakthrough or, in a new-fashioned manner, “modernization” in their area of work. Competitiveness of specialists with higher education is determined, as known from Russian practice, not by the level of training, but by the level of education of the population. The objective of the current reform of education is not to provide foreign scientific centers with well-educated Russian specialists, but to support Russian scientific, engineering, and educational programs.

The number of “half-specialist” bachelors, registered by labor registry offices and employment centers, is increasing. These young half-educated unemployed people will overflow the offices of these organizations and go into the streets; that is when we will learn the true price of the secondary and higher school reforms, which for decades have been implemented by our education authorities. A country with a low level of education of the population is doomed to suffer. Is it not the reason for recent failures in our once powerful space industry and social cataclysms that are shaking our Fatherland today?

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