

Volume 80, Number 4
July–August 2010

ISSN: 1019-3316



HERALD OF THE RUSSIAN ACADEMY OF SCIENCES


English Translation of *Vestnik Rossiiskoi Akademii Nauk*

Editor-in-Chief
Yurii S. Osipov

<http://www.maik.ru>
<http://www.springerlink.com>



PLEIADES PUBLISHING
МАИК "НАУКА/INTERPERIODICA"

Distributed by  Springer

Herald of the Russian Academy of Sciences

(*Vestnik Rossiiskoi Akademii Nauk*)

ISSN: 1019-3316

Editor-in-Chief
Yurii S. Osipov

Marmovskii per. 26, Moscow, 119049 Russia
Tel: 7 (499) 238-21-23; 238-21-44; Fax: 238-25-10
E-mail: west@maik.ru

EDITORIAL BOARD

Zhores I. Alferov, Alexandr F. Andreev, Vladimir N. Bol'shakov, Alexandr A. Boyarchuk,
Yevgenii P. Chelyshev, Alexandr O. Chubar'yan, Anatolii P. Derevyanko, Lyudvig D. Faddeev,
Georgii S. Golitsyn, Andrei A. Gonchar, Anatolii I. Grigor'ev, Yurii M. Kagan, Alexandr I. Kononov,
Valerii V. Kostyuk (Deputy Editor-in-Chief), Edward P. Kruglyakov, Nikolai P. Laverov, Vladilen S. Letokhov,
Igor M. Makarov, Gennadii A. Mesyats, Yurii V. Natochin, Oleg M. Nefedov, Alexandr D. Nekipelov,
Viktor I. Osipov, Rem V. Petrov, Vladislav V. Pirozhkov (Managing Editor), Dmitrii V. Rundkvist,
Filipp G. Rutberg, Nikolai P. Shmelev, Alexandr S. Spirin, Vyacheslav S. Stepin,
Vladimir I. Vasil'ev, Valentin L. Yanin

Acting Deputy Editor-in-Chief Tamara V. Mavrina

Editor of the English translation Boris O. Alekseev

SCOPE

The Russian Academy of Sciences publishes more than 250 journals, first among these being the *Herald of the Russian Academy of Sciences (Vestnik Rossiiskoi Akademii Nauk)*, which provides a broad coverage of the Academy's activities. Founded in 1931, it publishes the major works, speeches, and discussions presented in the Academy by the most eminent Russian and foreign scientists and presents the viewpoints of various disciplines on many important subjects related to the natural, technical, and social sciences. It addresses the scientist's role in society and the role of scientific knowledge in the modern world. Important issues involving our world that affect all major areas of science, education, and our environment are discussed by these top scientists. Space in the journal is regularly devoted to reporting the work of the Presidium of the Academy, results of research groups, awards, prizes, and nominations. For 60 years, the journal appeared only in Russian. Now available in English, this resource is indispensable for university and research departments, libraries, and researchers wanting to keep abreast of news and trends in their fields.

Herald of the Russian Academy of Sciences is abstracted and/or indexed in *Academic OneFile, CSA/Proquest, Current Contents/Physical, Chemical and Earth Sciences, Gale, Google Scholar, Journal Citation Reports/Science Edition, OCLC, Science Citation Index Expanded (SciSearch), SCOPUS, Summon by Serial Solutions.*

Herald of the Russian Academy of Sciences is available ONLINE by subscription from www.springer.com, www.springerlink.com.

Herald of the Russian Academy of Sciences (ISSN: 1019-3316 print version, ISSN: 1555-6492 electronic version) is published bimonthly by PLEIADES PUBLISHING, LTD. c/o Springer Science and Business Media, 233 Spring St., 6th Floor, New York, NY 10013.

POSTMASTER: Send address changes to *Herald of the Russian Academy of Sciences*, Springer, Customer Service Department, 233 Spring St., New York, NY 10013, USA.

Volume 80 (6 issues) is published in 2010.

Subscription Rates, Orders, Inquiries: Please contact the Springer Customer Service for the latest information:

The Americas (North, South, Central America and the Caribbean): Springer Journal Fulfillment, P.O. Box 2485, Secaucus, NJ 07096 2485, USA.

TEL: 800-SPRINGER (777-4643); TEL: +1-201-348-4033 (outside US and Canada); FAX: +1-201-348-4505; E-MAIL: journals-ny@springer.com.

Outside the Americas: via a bookseller or Springer Distribution Center GmbH, Haberstrasse 7, 69126 Heidelberg, GERMANY

TEL: +49-6221-345-4304; FAX: +49-6221-345-4229; E-MAIL: subscriptions@springer.com.

Cancellations must be received by September 30 to take effect at the end of the same year.

Change of address: Allow six weeks for all changes to become effective. All communications should include both old and new addresses (with postal codes) and should be accompanied by a mailing label from a recent issue. **Microform editions** are available from ProQuest at <http://www.ilproquest.com/umi/>

PUBLISHER

PLEIADES PUBLISHING, LTD.

c/o INTERNATIONAL ACADEMIC PUBLISHING COMPANY "NAUKA/INTERPERIODICA", PROFSOYUZNAYA UL. 50, MOSCOW, 117997, RUSSIA.
TEL: 7 (495) 336-1600; FAX: 7 (495) 336-0656; E-MAIL: comping@maik.ru; WEB: <http://www.maik.ru>.

The journal was founded in 1931.

Original Russian Edition Copyright © 2010 by the Russian Academy of Sciences and the RAS Presidium.

Copyright © 2010 by Pleiades Publishing, Ltd.

Printed in the USA

Volume 80, Number 4, 2010

Contents

A simultaneous English language translation of this journal is available from Pleiades Publishing, Ltd.
Distributed worldwide by Springer. *Herald of the Russian Academy of Sciences* ISSN 1019-3316.

Science and Society

- S. M. Rogov**
Russia Must Become a Scientific Superpower 313
-

On the Rostrum of the RAS Presidium

- Yu. D. Tret'yakov**
Morphological Diversity in the Nanodimensional World of Inorganic Substances and Materials 324
- R. S. Grinberg**
Public Interest and Economic Policy 331
- The Public and the Individual. Is Harmony Possible? (Paper Discussion)* 335
- R. I. Nigmatulin**
The Ocean: Climate, Resources, and Natural Disasters 338
-

From the Researcher's Notebook

- A. M. Gal'per and Yu. I. Stozhkov**
Panela Is Cracking a Window into the Dark Matter World 350
-

Review

- K. P. Ivanov**
Energy Problems of Life 354
-

Environmental Problems

- A. S. Kerzhentsev**
Soil Functionality and Ecosystem Sustainability 360
-

Organization of Research

- I. V. Shul'gina**
Russian Academic Science in the Mirror of the Federal Science Statistics 365
-

Point of View

- A. O. Karpov**
Knowledge Society: A Weak Link 372
- L. P. Verevkin and O. L. Verevkin**
The Importance of Education in the Eyes of the Public 378
-

Point of View

The object of this article is to provide insight into a system of educational ideas that are in the foreground of knowledge society's cognitive interest; ideas to which, unfortunately, our educational system, so enthused with organizational and economic reforms, is exposed very little.

DOI: 10.1134/S101933161004009X

Knowledge Society: A Weak Link

A. O. Karpov*

But the misery is, that the most effectual means are
now applied to the ends least to be desired.

Francis Bacon

It has become clear that the system of education not only determines directly the opportunities of economic growth but also solves the problem of advanced cultural growth of a personality and, consequently, forms the economy and society of tomorrow. The fact that this society will be doomed to use knowledge as the main driving force is clear to everyone; however, speculations about what education should be like tomorrow are still rather theoretical.

How can children think better and teachers teach them to think better in an environment of the rampant growth and socioeconomic expansion of knowledge? This problem focuses on the contents and methods of education that can explicate the cultural future in present-day textbook. We are speaking about special generative didactics and the special cognitive diversity of a learner's personality. Both educational theory and practice are dealing with a new problem set forth by a society that has to think about its culturally authentic *today* through the prism of a quite specific and distinct *tomorrow*.

In this context, the system of Russian education at all levels is a weak link in our society in its movement toward the culture and economy of tomorrow. Owing to the oddities of the educational system, our children are facing the necessity to take in a back-breaking volume of unsystematized and simply useless knowledge (what would you say to psychology in the first grade?!). Teachers use teaching techniques so inefficient and educationally inconsiderate that impel cramming, parental help, and tutoring. The latter is simply imposed under the threat of failure and misunderstanding.

* Aleksandr Olegovich Karpov, Cand. Sci. (Phys.–Math.), is head of the Department of Educational and Scientific Youth Programs at Bauman State Technical University, Moscow.

Learning is turning knowledge into information, and even literature is viewed in this perspective. Educational information (including that from the "educative" Internet), unlike knowledge, is prone to quick decay, since it is not psychologically integrated by the activity of thought. Thus, action, which is always knowledge dependent, becomes impossible. So, we are bringing up not just dabblers but butterfingers. Our system of education, especially school education, is degrading more and more in its teaching methods and degree of learnedness. It is largely the domestic school that is to blame for the fact that "40% of adult Russians have not read a book in a year" [1, p. 2].

In view of the new social reality, Western specialists note the cultural lag of education from the cognitive conditions of the times, because scientific thinking is viewed today through the conceptual glossary of Bohr, Heisenberg, and Prigogine, while school (and, indeed, university) programs find themselves closer to the epistemic system of Descartes, Newton, and Laplace [2, p. 158].

Our Russian reality is ousting the language of our great compatriots Landau, Sakharov, and Prokhorov from schools. The drawbacks of the general education system and demographic losses impose a deficit of creative students capable of mastering complex programs in the system of higher education and especially in technical higher educational establishments that ensure a high level of vocational training.

L.N. Glebova, head of the Federal Education and Science Supervision Agency, stated that in 2009, according to the Unified State Examination results, technical higher educational establishments enrolled extremely unprepared school graduates, and those of them with the lowest grades enrolled in specialty to become teachers of physics. "Now," stated Glebova, "school students will be taught by the most unprepared teachers, and those who will have failed to enroll

in economics and law owing to their poor grades will go to technical higher educational establishments" [3, p. 10]. The survey conducted by the Higher School of Economics says that the level of training of the freshmen in high-tech specialties corresponds to a weak C according to the old grade system [4, p. 7].

The main trait of European universities is a research-teaching relationship. For example, Cambridge University's revenues from intellectual activity reach 3.5 million a year. In 2008 alone, its staff received 120 patents and 35 licenses [5, p. 22]. In Russia, on the contrary, according to Ya.I. Kuz'minov, rector of the Higher School of Economics, "only 16% of teachers are engaged in research in one-third of all higher educational establishments. There are higher educational establishments with only 2–3% of teachers engaged in research solely for their own enjoyment" [6, p. 6].

The existing cognitive and cultural disconnect between the needs of social life, based on the growing knowledge production systems, and education at domestic schools and universities is fully set by the sorry state of educational theory with its crusty teaching models within maintenance learning. "One of the most crucial objectives of educational science today," the authoritative Russian educational scientist V.V. Kraevskii thinks, "is the development of new educational contents and corresponding methods" [7, p. 16].

No Limits to Learning, the report to the Club of Rome published 30 years ago by J.W. Botkin, M. Eluardjia, and M. Malitza, indicated changes brewing in education. This document, which greatly influenced the whole system of Western education, formulated and justified a political position according to which the hope for maintenance learning under the current conditions is a recipe for disaster [8].

The main role in creating knowledge within the EU Lisbon Strategy is given to universities, because they are at the intersection of research, education, and innovation. The uniqueness of universities is in their genetic engagement in the basic structures of knowledge society. What is meant here is new knowledge generation, transfer through educational and learning networks, dissemination with the help of information technologies, and use in new production processes and in the service sector. Specialists say that today society's educational and economic strategies are inseparable. At the European conference in Hampton Court in October 2005, universities were called the basis of European competitiveness [9]. In a 2006 communiqué, the EU Commission called for the implementation of educational reforms within the true European approach and without imitating borrowed and imported models. The commission also called for protection of the national interests of the EU member countries in competition. The EU countries must not

encourage brain drain, allowing for only brain circulation within the EU educational area [9].

Competition policy for the best students and teachers in the European Union is based on the ideology of research supremacy, the decisive factor of which is supremacy in research learning. We assume that, regardless of all Russian reverence toward the integrationist ideas of European bureaucrats, we should expect nothing but strict educational and scientific protectionism with regard to talent involvement and preservation, and this protectionism acts exclusively in the economic interests of the European Union.

Russia has an extremely unfavorable age structure of its research personnel for replenishing the scientific contingent. According to the Russian Ministry of Education and Science, the number of scientists and highly skilled specialists decreased by 58% between 1990 and 2005; brain drain, as well as internal migration, has resulted in the loss of more than one million scientists [10]. The British Council's data illustrate the urgency of this problem: developed economies will increase the share of students majoring in high technology by 8% a year. These data were given in an article with the very alarming title "Russian Students Choose London" [11].

European competitiveness also implies educational diversity, from which European universities expect maximum gains. Deep cultural and legislative differences led a few years ago to postponing the completion of the Bologna reforms from 2010 to 2020 [9]. In 2009, after a decade of attempted educational unifications, the EU Commission had to state the following [12, p. 1]:

It is noteworthy that the articulation between vocational education ... and the first cycle of higher education is a matter of significant divergence of approach across the European region Countries where vocational education is organized as a separate system outside the university sector have tended to ignore the Bologna approach. Only ten countries have consciously adapted the Bologna structures (particularly the bachelor concept) to include this level of education.

It is obvious that the key tool of modernizing European education at present is not the organizational approach, but educational one, which is absolutely absent in the system of Russian educational reforms. It is this approach, its methods and content, that will dictate the reasonable forms of educational coherence in the near future.

The current European concept of education through research is developing the ideas of W. Humboldt and their further interpretation by J. Habermas in the context of communicative rationality under new sociocultural conditions. The task of a university is not research and education but education through

research. The result of such education is treated as mastering basic competences that are continually needed in a knowledge society. European sociological analysis has shown a high degree of compliance of employment competences with those that participate in conducting research.

Note that the understanding of competence simply as the ability to use knowledge in a learning or "living" environment is incomplete. Knowledge from boundary areas, for example, is in no way involved in a competence construed this "narrowly." However, this knowledge is absolutely necessary for the work of any self-respecting professional. Consequently, the fact that demand is dictated by competence does not at all promise true competitiveness. In the end, it is the structure and content of individual culture-friendly arranged classes, also understood as "knowledge-activity," that comprise the fundamental basis of competitiveness and, finally, the demand for a personality.

On the most general educational plane, a competent approach is not an educational novelty; it expresses one of two educational traditions, which have been competing since antiquity: in our case, "education for life" takes the upper hand over "education for man." Today we find the closure of these traditions in that narrow view on knowledge in general as knowledge culture, and this approach makes educated, hence, active people indistinguishable from their other hypostasis: humans as cultured persons.

The "research" approach to learning puts before European universities the difficult task of teaching higher education disciplines by researchers not only in senior but also in junior years. Solving this problem is a necessary but not the sole condition for research learning, since a practicing researcher can teach a subject without passing on to students the research attitude to knowledge, i.e., dogmatically (uncritically). At the same time, European universities are seriously concerned with the level and content of scientific education, especially because they train teachers of exact sciences for secondary schools. The educational aspect of the problem is that the starting point for education through research should be the use of research as a teaching method. Thus, we raise the problem of the efficient educational operationalization of research as a teaching method. This operationalization is the basis for a new, generative, didactics.

Taking into account the knowledge culture requirements, educational epistemology is considered more generative than representative. A somewhat clarifying example can be the approach to the current assessment of knowledge of a student that is viewed in opposition to the Cartesian-Newtonian paradigm of reference knowledge, which strictly differentiates winners from losers for educational purposes. The traditional assessment, based on the correlation of a student's results and preset standards, does not measure significantly what the student has worked out indepen-

dently. Generative and not simply summarizing assessment focuses on what a student can do with acquired knowledge and not on how well the acquired knowledge corresponds to the framework set by others [2, p. 127].

One of the central ideas of modern pedagogy lies in the notion of *teaching transformation*, which implies the self-movement and autoregulation of cognitive activity and rests on a network of open and independent interactions that result in an efficient (in the eyes of a student) change in the learning content, so that this content becomes a process. A transformative curriculum is an open self-transforming learning system capable of synchronizing the learning process with personal growth by making use of knowledge psychically comfortable in problem situations.

In fact, self-transformation implies the ability of a curriculum to restructure its cognitive activity schemes on the basis of the current generative assessment of a student. The self transformation of a curriculum acts through didactics as a self-based transformation, and, externally, through sociocultural interaction, which provides material for the creative self-change of an individual and for discernment between learning illusions and what really exists. From here, the idea of teaching transformation radically shifts the attention of education to the cognitive nature of a growing personality. The function of a self-transforming curriculum is controlled by the transformative framework, which is not as much a content "implication" as built-in normative structures (of different degrees of rigidity) with coercive power.

The cognitive flexibility of a curriculum is its ability for cognitive adjustment, both individual and collective, i.e., for the didactical focus of teaching content and methods on the cognitively special in the cognitive activity of a student. Unlike learning variability, which implies a cognitive menu formed by an external agent, cognitive flexibility implies the internal capacities of a curriculum to meet the cognitive preferences of a growing personality. Cognitive flexibility leads to the formation of cognitive diversity, first, in an educational team, and, later, in the cognitively active part of society. Cognitive diversity is determined by a set of actualized cognitive personality types that function in society. A cognitive personality type brought to psychical disclosure rests on a complex of intellectual abilities that determine its tendency to specific forms of individual cognitive activity in various subject areas.

Cognitive flexibility is rendered through the special methodological and environmental richness of a curriculum. This is not just a certain set of individual possibilities but a functionally organized and structured transformative didactic system that generates cognitively diverse learning by constructing didactic strategies. Cognitive flexibility determines the feasibility of individual aspirations of a student to build an integral structure of a personality. However, integrity does not

imply cognitive unidimensionality, since integrity and diversity are different notions. The aspirations of a student take form in the totality of individual and collective cognitive paths and interactions between them as a tool to autocorrect cognition. The cognitive development of a contemporary personality, focused on the competence of a research type, is described by an individual problem-learning program.

Individual cognitive choice as the evaluation of one's own perspectives is the basis for the professional self-identification of a student in the contemporary cultural situation. Participation in a problem reality predetermines the flexibility of individual cognitive growth and the development of a personality, which has its priorities, decisions, and reflections [13]. The cognitive flexibility of a curriculum depends on its didactic transformativeness, which determines what the learner is allowed to see. The transformative framework of a didactic type forms the adjustable range of realities perceived in learning and placed in the subject field. It sets limitations on the system of ideas and cognitive feelings and, finally, on the representation of the truth. Such didactic rigidity is a product of the cognitive structure of society rather than of ideology, because it rests on the traditions and systems of standardized knowledge. However, no doubt, ideology selects the cognizable and transforms the cognitive view. Didactic rigidity chains the justification of thought by suggesting to it contextually prepared knowledge.

The cognitive generativity of a curriculum is the ability to educate a mentality that is discovering the world, i.e., a mentality that operates creatively with explorative, constructivist, and hermeneutical forms of human cognition. Cognitive generativity rests on the structure of a curriculum, which depends on the curriculum's richness, and has a complex configuration of ideas and levels of competing sense. While the cognitive flexibility of a curriculum forms the cognitive diversity of a collective, its generativity is responsible for the cognitive diversity of a personality. Creativity individualizes using the richness of a curriculum; individual creativity uncovers the spectrum of its potential capabilities. Hence, we have a combination of cognitive flexibility and generativity—a path to the creative uniqueness of every person.

The inclusion of generative cognition, i.e., cognition that triggers the creation of new knowledge, new meanings, and new understandings, into learning culture is a response to the challenge of social reality, which nowadays emphasizes the cognitive-active nature of humans. Generative cognition raises the ability to create individual mental schemes and subjective knowledge from direct experience, as opposed to the traditional approach where a student only copies the mental matrices and cognitive experiences of others. The generative sense is typical of E. Kösel's "subjective didactics," which produces a learning cul-

ture that relies on multiplanning, competing thought and behavior samples, and students' knowledge construction in a problem environment [14, p. 443].

Resolving nonstandard and poorly formulated problem situations represents a regular social practice today more than ever before. Therefore, modern curricula function as transformative cognitive systems with open problems and are open to problems. Structuring a problem situation by separating problems and their relations implies the presence of the abilities to see and understand problems before they are solved. Intuitive forms of cognition underlie new knowledge and mediate the principle of the transcendentalism of scientific cognition. For example, L.A. Mikeschina writes in the book *Philosophy of Cognition*, "It appears that radical changes in the sphere of learning and education in general that form new intelligence are largely programs that develop techniques and operations of transforming fundamental intuition" [15, p. 246].

Open problems in modern learning are set in the conditions of high cognitive uncertainty and problem contextualization. As they are solved, they imply the stages of conceptualization and hypothesization, forecasting and planning, research and construction, modeling and technologization, and appraisal of results and consequences. Unlike the deterministic search for one unique solution, characteristic of traditional learning, open problems imply multiple solutions that describe a problem situation from different angles. They are incorporated into educational practices through the educational-scientific environment, creating a system of contingencies and cognitive perspectives. It is in this system of relations that the content of learning becomes a process, because it represents a contingent product of research into the unknown and not the transfer of reference knowledge.

The cognitive generativity of a curriculum is determined by its epistemic transformativeness, which establishes what the seeking imagination is allowed to produce. The transformative framework of the epistemic type sets the range of thought changes caused by learning. This framework forms the rules of handling knowledge and the criteria of the legitimate forms of thinking and puts limitations on the models of creation and development of ideas and, consequently, on the attainability of the truth. At the same time, such limitations stimulate a creative personality in the desire to become an understandable person. The epistemic rigidity of learning is a product of the world-view setups of a social group that controls learning. This group serves ideology and infuses thoughts on how and where it should proceed. Here the capabilities of ideology are almost limitless, and, at the same time, the main object of its claim is ideologically channeled human thought.

How precisely is reality represented in learning systems? It is immersed into the interpreted perceptions and dogmatized assumptions of a syllabus. These

intellectual skeletons and cognitive clichés, in other words, prescribed structures of knowledge and cognition, are used by educational tradition to judge and assess reality. The representation of reality in learning and through learning inside the learner is the main question of modern education. This representation is bringing today's educational institutions to the creation of a self-developing environment of cooperation with external life structures.

The European University Association sees the educational system as the main communicative link of the knowledge economy and modern universities as open and mobile educational institutions that consolidate interaction between public and cultural organizations, governmental structures, and the business community. D. Carr regards educational institutions as an instrument of initiating complex sociocultural practices [16]. J. Tomlinson sees the contemporary school as having close interaction with external culture and thus creating coherent knowledge [17].

The sociocultural interaction of a curriculum is the inclusion of spiritual and material perspectives, as well as public life experiences, into knowledge acquisition practices. It acts as a tool of the creation and function of efficient learning environments and thus determines the order and intensity of reality ushered into learning activities. The main message of modern pedagogy in sociocultural interaction is prospective education.

The world is inductive rather than instructive, and modern pedagogy sees learning as an open and self-organizing cognitive system. To this end, sociocultural interaction acquires a genetic educational status and acts as a mediator between didactics and cognitive competence. Hence, in modern education, it gains the main regulatory function of determining cognitive objectives, boundaries, and opportunities.

The setup for the innovative trend reconstructs the architecture of learning communities in the direction of integrated educational systems. Scientific, professional, and cultural institutions of society fit into the shape of educational establishments. Here teaching methods receive a unified basis not only as the resource base and knowledge but also as involved specialists. The learning environment, which is more open and contextually rich, provides a wide range of opportunities for verifying one's vocation. A curriculum focuses on cultural contextual learning; i.e., it acquires the quality of a culturally open didactic system.

The objective of socialization is set not simply in the perspective of a person integrated into society but also in the context of one's personal cognitive synchronization with the future culture of a specific society. This is the basis for our research socialization concept. Thus, the translational paradigm in education, which is authorized only to transfer the sociocultural experience of the past years, is ending. Individual

worldviews, behavior samples, social roles, and cognitive tools—all these are largely becoming hostages of the future perspectives of human culture, whose practices build on the growth of scientific knowledge.

Sociocultural interaction through the creation of generalized knowledge resources is the latest trend in the European educational policy. This concept is based on the idea of uniting scientific university environments at the global level into network structures that use the strong points of their participants. The thus-concentrated reserve fund of knowledge, talent, and energy becomes a strategic resource of society for solving interdisciplinary problems. Economically, quite new and socially responsible is the task of independent control over university networks within knowledge marketization and innovation policy. It is assumed that relations with the business community, the government, and the public at large are placed here at minimum on an equal and consolidated basis. Knowledge receives its true social value and yields profits and superprofits, and interaction with business acquires strategic importance in terms of knowledge conversion into a specific product, process, and technology, as well as promotion of cultural and social innovations. Thus, an aggressive ideology of the educational supremacy of European knowledge society is being built. Networks that have united the best research universities and research centers of Europe leave no hope for "a place under the sun" for other countries.

The sociocultural interaction of a curriculum determines reality structures that mediate learning. The transformative environmental framework limits the number of cultural templates and social roles. Their cultural restrictions segregate, for example, the ethnic experience of national minorities, represented in their ethics, language, literature, and costume, and their social restrictions exclude (intentionally at times) the life concepts of poor, unprivileged, and marginal groups. Mechanisms of excluding the multidimensionality of the truth are thus being instilled. However, A. Wright notes that uniqueness is imprinted in culture, and the integrity of a single public consciousness largely depends on the state of identity of small groups [18].

The environmental rigidity of a curriculum is the product of social policy, which determines legitimate skeletons and anthropological bases of the life of society. While didactic rigidity limits the grounds for reasoning and epistemic rigidity prescribes how and what to think, environmental rigidity sets meaningful boundaries for the interpretations of reality by suggesting understandings of the sphere of human activity. Thus, it is the sociocultural interaction of a curriculum today that solves the problem of the authenticity and social adaptability of learning knowledge. A thinking human is not taught by financial standards and organizational structures; a thinking human is

taught by a knowledgeable human. This is the true sense of societal and personal education.

REFERENCES

1. I. Vorob'eva, "Putir Has Broken the Tradition," RBK Daily, No. 184 (2009).
2. W. E. Dool, *A Post-Modern Perspective on Curriculum* (Teacher College Press, New York, 1993).
3. L. N. Glebova, "You Are Invited," Poisk, No. 39 (2009).
4. N. Bulgakova, "The October Revolution," Poisk, No. 40 (2009).
5. S. Belyaeva, "Counting on Mutuality: Britain's Universities and Science Parks Are Happy with Each Other," Poisk, Nos. 24, 25 (2009).
6. "In Transition: An Interview with Ya. Kuz'minov by N. Bulgakova," Poisk, No. 20 (2009).
7. V. V. Kraevskii and E. V. Berezhnova, *The Basics of Student Research Activities* (Izd. Isestr Akademiya, Moscow, 2005).
8. J. W. Botkin, M. Elmandjra, and M. Malitza, *No Limits to Learning: Bridging the Human Gap: A Report to the Club of Rome* (Pergamon, Oxford, 1979).
9. "Delivering on the Modernization Agenda for Universities: Education, Research, and Innovation," in *Communication from the Commission to the Council and the European Parliament* (Comm. Eur. Communities, Brussels, 2006).
10. A. Terekhov, "Personnel behind the Scenes?" Poisk, Nos. 3, 4 (2009).
11. E. Kravchenko and I. Kelomeiskaya, "Russian Students Choose London," Izvestiya, No. 173 (2004).
12. *Higher Education in Europe 2009: Developments in the Bologna Process/MEMO/09/172* (Comm. Eur. Communities, Brussels, 2009).
13. S. E. Cuypers, "Critical Thinking, Autonomy, and Practical Reason," *J. Philos. Ed.* 38 (1) (2004).
14. A. P. Ogurtsov and V. V. Platonov, *Education's Images: The 20th-Century Western Philosophy of Education* (RKhGI, St. Petersburg, 2004) [in Russian].
15. L. A. Mikeshina, *Philosophy of Cognition: Polemical Chapters* (Progress-Traditsiya, Moscow, 2002) [in Russian].
16. D. Carr, *Making Sense of Education* (RoutledgeFalmer, London, 2003).
17. J. Tomlinson, "Policy and Governance," in *Tomorrow's Schools: Towards Integrity*, Ed. by C. Watkins, C. Lodge, and R. Best (RoutledgeFalmer, London, 2000).
18. A. Wright, "The Politics of Multiculturalism," *Studies Philos. Ed.* 23, 299 (2004).

Translated and Published by **Pleiades Publishing, Ltd.**
Distributed Worldwide by **Springer**

BIOCHEMISTRY (MOSCOW)

Editor-in-Chief
Vladimir P. Skulachev
Member of the Russian Academy of Sciences

Biokhimiya was founded by the Russian Academy of Sciences (formerly the Academy of Sciences of the USSR) and the Russian Biochemical Society in 1936. The journal includes research papers in all fields of biochemistry as well as biochemical aspects of molecular biology, bioorganic chemistry, microbiology, immunology, physiology, and biomedical sciences. Coverage also extends to new experimental methods in biochemistry, theoretical contributions of biochemical importance, reviews of contemporary biochemical topics and mini-reviews (News in Biochemistry). This journal is intended for scientists, postgraduates, teachers at universities and high schools, students, and specialists at research institutes. It is also a valuable resource which provides regular and essential information for libraries of university research departments, biotechnology, and biomedical departments. In 2008, *Biochemistry (Moscow)* will have one supplementary issue in addition to the twelve regular issues. It will be published in English only.

Biochemistry (Moscow) is abstracted or indexed in *Agricola*, *Biochemistry and Biophysics Citation Index*, *Biological Abstracts*, *BIOSIS Database*, *Chemical Abstracts*, *Chemical Titles*, *Current Contents/Life Science*, *Excerpta Medica*, *Index International de Cradologie*, *Index Medicus (MEDLINE)*, *International Abstracts of Biological Sciences*, *The ISI Alerting Services*, *Science Citation Index*, and *Science Citation Index Expanded*.

Subscription Information: 2010 Volume 75 • 12 issues + 1 supplementary issue
ISSN 0006-2979 (print) • ISSN 1605-3040 (online)

Subscription Rates, Orders, Inquiries: Please contact the Springer Customer Service for the latest information:

The Americas (North, South, Central America and the Caribbean): Springer Journal Fulfillment, P.O. Box 2485, Secaucus, NJ 07096-2485, USA
TEL: 800-SPRINGER (777-4643); TEL: +1-201-348-4033 (outside US and Canada); FAX: +1-201-348-4505; E-MAIL: journals-ny@springer.com.
Outside the Americas: via a bookseller or Springer Distribution Center GmbH, Haberstrasse 7, 69126 Heidelberg, GERMANY
TEL: +49-6221-345-4304; FAX: +49-6221-345-4229; E-MAIL: subscriptions@springer.com.

Translated and Published by **Pleiades Publishing, Ltd.**
Distributed Worldwide by **Springer**

INLAND WATER BIOLOGY

Editor-in-Chief
Dmitry S. Pavlov
Academician of the Russian Academy of Sciences

Inland Water Biology (Biologiya Vnutrennikh Vod) publishes thematic reviews and original papers devoted to flora and fauna in waterbodies, biodiversity of hydrobionts, biology, morphology, systematics, ecology, ethology, ecological physiology and biochemistry of aquatic organisms, patterns of biological cycle, structure and functioning of aquatic ecosystems, anthropogenic and uncontrolled natural impacts on aquatic organisms and ecosystems, invasion of nonindigenous species into ecosystems and their ecology, methods of hydrobiological and ichthyological studies, as well as book reviews, information about symposia, conferences and congresses.

Inland Water Biology is available ONLINE by subscription from www.springer.com, www.springerlink.com.

Subscription Information: 2010 Volume 3 • 4 issues • ISSN 1995-0829 (print) • ISSN 1995-0837 (online)

Subscription Rates, Orders, Inquiries: Please contact the Springer Customer Service for the latest information:

The Americas (North, South, Central America and the Caribbean): Springer Journal Fulfillment, P.O. Box 2485, Secaucus, NJ 07096-2485, USA
TEL: 800-SPRINGER (777-4643); TEL: +1-201-348-4033 (outside US and Canada); FAX: +1-201-348-4505; E-MAIL: journals-ny@springer.com.
Outside the Americas: via a bookseller or Springer Distribution Center GmbH, Haberstrasse 7, 69126 Heidelberg, GERMANY
TEL: +49-6221-345-4304; FAX: +49-6221-345-4229; E-MAIL: subscriptions@springer.com.

Gain Immediate Access to Critical Russian Research

The following journals published by Allerton Press, Inc., a division of Pleiades Publishing, are now available together with other journals of Pleiades Publishing

MATHEMATICS

Automatic Control and Computer Sciences – Vol. 44, 7 issues.

Automatic Documentation and Mathematical Linguistics – Vol. 44, 6 issues.

Journal of Contemporary Mathematical Analysis – Vol. 45, 6 issues.

Mathematical Methods of Statistics – Vol. 19, 4 issues.

Mechanics of Solids – Vol. 45, 6 issues.

Moscow University Computational Mathematics and Cybernetics – Vol. 34, 4 issues.

Moscow University Mathematics Bulletin – Vol. 65, 6 issues.

Moscow University Mechanics Bulletin – Vol. 65, 6 issues.

Russian Mathematics (Iz. VUZ) – Vol. 54, 12 issues.

Scientific and Technical Information Processing – Vol. 37, 6 issues.

Siberian Advances in Mathematics – Vol. 20, 4 issues.

Vestnik St. Petersburg University: Mathematics – Vol. 43, 4 issues.

PHYSICS

Applied Solar Energy – Vol. 46, 4 issues.

Bulletin of the Crimean Astrophysical Observatory – Vol. 106, 1 issue.

Bulletin of the Lebedev Physics Institute – Vol. 37, 12 issues.

Bulletin of the Russian Academy of Sciences: Physics – Vol. 74, 12 issues.

Journal of Contemporary Physics – Vol. 45, 6 issues.

Journal of Superhard Materials – Vol. 32, 6 issues.

Kinematics and Physics of Celestial Bodies – Vol. 26, 6 issues.

Moscow University Physics Bulletin – Vol. 65, 6 issues.

Optical Memory and Neural Networks – Vol. 19, 4 issues.

Optoelectronics, Instrumentation and Data Processing – Vol. 46, 6 issues.

Physics of Wave Phenomena – Vol. 18, 4 issues.

Radioelectronics and Communications Systems – Vol. 53, 12 issues.

CHEMISTRY

Coke and Chemistry – Vol. 53, 12 issues.

International Journal of Self-Propagating High-Temperature Synthesis – Vol. 19, 4 issues.

Journal of Water Chemistry and Technology – Vol. 32, 6 issues.

Moscow University Chemistry Bulletin – Vol. 65, 6 issues.

Solid Fuel Chemistry – Vol. 44, 6 issues.

BIOSCIENCES

Cytology and Genetics – Vol. 44, 6 issues.

Molecular Genetics, Microbiology and Virology – Vol. 25, 4 issues.

Moscow University Biological Sciences Bulletin – Vol. 65, 4 issues.

Moscow University Soil Science Bulletin – Vol. 65, 4 issues.

Russian Agricultural Sciences – Vol. 36, 6 issues.

EARTH SCIENCES

Moscow University Geology Bulletin – Vol. 65, 6 issues.

Russian Meteorology and Hydrology – Vol. 35, 12 issues.

Seismic Instruments – Vol. 46, 4 issues.

ENGINEERING

Journal of Friction and Wear – Vol. 31, 6 issues.

Journal of Machinery Manufacture and Reliability – Vol. 39, 6 issues.

Russian Aeronautics (Iz. VUZ) – Vol. 53, 4 issues.

Russian Electrical Engineering – Vol. 81, 12 issues.

Russian Engineering Research – Vol. 30, 12 issues.

Russian Journal of Non-Ferrous Metals – Vol. 31, 6 issues.

Steel in Translation – Vol. 40, 12 issues.

Surface Engineering and Applied Electrochemistry – Vol. 46, 6 issues.

For editorial inquiries, visit
Allerton Press, Inc.

<http://www.allertonpress.com>
250 West 57th Street, New York, NY 10107

distributed worldwide by
Springer

Journals Customer Service

P.O. Box 2485,

Secaucus, NJ 07096, USA

Tel: 800 777 4643; Fax: 201 348 4505

E-mail: journals-ny@springer.com

To access a free issue, go to www.springerlink.com

MAIK "Nauka/Interperiodica" and Pleiades Publishing
are pleased to present to the international scientific community
simultaneous Russian- and English-language publication of the journals
of the Russian Academy of Sciences
2010 volumes include the following titles:

- *Acoustical Physics*
- *Applied Biochemistry and Microbiology*
- *Astronomy Letters*
- *Astronomy Reports*
- *Astrophysical Bulletin*
- *Atmospheric and Oceanic Optics*
- *Automation and Remote Control*
- *Biochemistry (Moscow)*
- *Biochemistry (Moscow), Series A: Membrane and Cell Biology*
- *Biochemistry (Moscow), Series B: Biomedical Chemistry*
- *Biology Bulletin*
- *Biophysics*
- *Catalysis in Industry*
- *Cell and Tissue Biology*
- *Colloid Journal*
- *Combustion, Explosion, and Shock Waves*
- *Computational Mathematics and Mathematical Physics*
- *Contemporary Problems of Ecology*
- *Cosmic Research*
- *Crystallography Reports*
- *Differential Equations*
- *Doklady Biochemistry and Biophysics*
- *Doklady Biological Sciences*
- *Doklady Chemistry*
- *Doklady Earth Sciences*
- *Doklady Mathematics*
- *Doklady Physical Chemistry*
- *Doklady Physics*
- *Earth Research from Space*
- *Entomological Review*
- *Eurasian Soil Science*
- *Fluid Dynamics*
- *Functional Analysis and Its Applications***
- *Geochemistry International*
- *Geology of Ore Deposits*
- *Geomagnetism and Aeronomy*
- *Geotectonics*
- *Glass Physics and Chemistry*
- *Gravitation and Cosmology*
- *Gyroscope and Navigation*
- *Herald of the Russian Academy of Sciences*
- *High Energy Chemistry*
- *High Temperature*
- *Human Physiology*
- *Inland Water Biology*
- *Inorganic Materials*
- *Inorganic Materials: Applied Research*
- *Instruments and Experimental Techniques*
- *Izvestiya, Atmospheric and Oceanic Physics*
- *Izvestiya, Physics of the Solid Earth*
- *JETP Letters*
- *Journal of Analytical Chemistry*
- *Journal of Applied and Industrial Mathematics*
- *Journal of Applied Mechanics and Technical Physics*
- *Journal of Communications Technology and Electronics*
- *Journal of Computer and Systems Sciences International*
- *Journal of Engineering Thermophysics*
- *Journal of Evolutionary Biochemistry and Physiology*
- *Journal of Experimental and Theoretical Physics*
- *Journal of Ichthyology*
- *Journal of Mining Science*
- *Journal of Structural Chemistry*
- *Journal of Surface Investigation. X-ray, Synchrotron and Neutron Techniques*
- *Journal of Volcanology and Seismology*
- *Kinetics and Catalysis*
- *Laser Physics*
- *Lithology and Mineral Resources*
- *Lobachevskii Journal of Mathematics*
- *Mathematical Models and Computer Simulations*
- *Mathematical Notes*
- *Microbiology*
- *Molecular Biology*
- *Nanotechnologies in Russia*
- *Neurochemical Journal*
- *Numerical Analysis and Applications*
- *Oceanology*
- *Optics and Spectroscopy*
- *p-Adic Numbers, Ultrametric Analysis and Application*
- *Paleontological Journal*
- *Pattern Recognition and Image Analysis*
- *Petroleum Chemistry*
- *Petrology*
- *Physics of Atomic Nuclei*
- *Physics of Particles and Nuclei*
- *Physics of Particles and Nuclei. Letters*
- *Physics of the Solid State*
- *Plasma Physics Reports*
- *Polymer Science, Series*
- *Problems of Information Transmission*
- *Proceedings of the Steklov Institute of Mathematics*
- *Programming and Computer Software*
- *Protection of Metals and Physical Chemistry of Surfaces*
- *Radiochemistry*
- *Regular and Chaotic Dynamics*
- *Russian Chemical Bulletin***
- *Russian Journal of Applied Chemistry*
- *Russian Journal of Biological Invasions*
- *Russian Journal of Bioorganic Chemistry*
- *Russian Journal of Coordination Chemistry*
- *Russian Journal of Developmental Biology*
- *Russian Journal of Ecology*
- *Russian Journal of Electrochemistry*
- *Russian Journal of General Chemistry*
- *Russian Journal of Genetics*
- *Russian Journal of Inorganic Chemistry*
- *Russian Journal of Marine Biology*
- *Russian Journal of Mathematical Physics*
- *Russian Journal of Nondestructive Testing*
- *Russian Journal of Organic Chemistry*
- *Russian Journal of Pacific Geology*
- *Russian Journal of Physical Chemistry A*
- *Russian Journal of Physical Chemistry B*
- *Russian Journal of Plant Physiology*
- *Russian Metallurgy (Metally)*
- *Russian Microelectronics*
- *Semiconductors*
- *Siberian Mathematical Journal*
- *Solar System Research*
- *Stratigraphy and Geological Correlation*
- *Studies on Russian Economic Development*
- *Technical Physics*
- *Technical Physics Letters*
- *The Physics of Metals and Metallography*
- *Theoretical and Mathematical Physics*
- *Theoretical Foundations of Chemical Engineering*
- *Thermal Engineering*
- *Thermophysics and Aeromechanics**
- *Water Resources*

* *Thermophysics and Aeromechanics* is only distributed by Pleiades Publishing, Inc.

** The journal is produced under contracts between Plenum Publishing and the Russian Academy of Sciences and/or its divisions, the institutes, and the editorial boards, and under contract and subcontract between Kluwer Academic/Plenum Publishers and Pleiades Publishing, Inc.

Please direct all inquiries about the above journals to: **Springer**

The Americas (North, South, Central America and the Caribbean): Springer Journal Fulfillment, P.O. Box 2485, Secaucus, NJ 07096-2485, USA
 TEL: 800-SPRINGER (777-4643); TEL: +1-201-348-4033 (outside US and Canada); FAX: +1-201-348-4505; E-MAIL: journals-ny@springer.com.
 Outside the Americas: via a bookseller or Springer Distribution Center GmbH, Haberstrasse 7, 69126 Heidelberg, GERMANY
 TEL: +49-6221-345-4304; FAX: +49-6221-345-4229; E-MAIL: subscriptions@springer.com.

Address for correspondence:

Plossoyuznaya ul., 90, Moscow, 117997, Russia. Phone: 7 (495) 336 1600; Fax: 7 (495) 336 0666.
 E-mail: compmg@maik.ru, <http://www.maik.ru>