Eurasia Journal of Mathematics, Science and Technology Education 2017 vol.13 N7, pages 3919-3933

Development of meta-subject competencies of the 7-9 grades basic school students through the implementation of interdisciplinary mathematical courses

Gorev P., Masalimova A.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© Authors. The article is aimed at describing one of the possible interdisciplinary courses for students of the 7-9 classes of the basic school connecting mathematics with natural sciences and the study of such courses role in the formation and development of meta-subject competencies of students. The leading method for this is the modeling of interdisciplinary courses, the main tools for the development of meta-subject competence in which are the interdisciplinary character of the content, including open and partially open type tasks in the course structure and the organization of project activities of schoolchildren in the field of studying mathematics and related disciplines. As a result of the research conducted by the authors they worked out several author's interdisciplinary courses, among them a special place is taken by the course "Mathematics in Natural sciences" for the classes of the natural-science profile. It is suggested in it to consider mathematical questions when applying them to the material of related disciplines both through the study of theoretical material and in the process of solving problems, including the open type, and involving schoolchildren in the project of interdisciplinary activity. Practical use of the interdisciplinary courses allows to see the achievements of meta-subject results by schoolchildren and the successes of students both in mathematical preparation, expressed by high marks on the subject, and related disciplines, which indicates the improvement of mathematical education quality of students who received training using the proposed methodology.

http://dx.doi.org/10.12973/eurasia.2017.00764a

Keywords

Creative development, Intersubject relations, Mathematical educatio, Meta-subject approach, Project activity

References

[1] Alsina, K. (2014). Metro maps and neural networks. Graph theory. Moscow: De Agostini
[2] Bassa, M I.B. (2014). A new view of the world. Fractal geometry. Moscow: De Agostini

[3] Bavrin, I.I. (2003). A short course of higher mathematics for chemical-biological and medical specialties. Moscow: FIZMATLIT

[4] Bunimovich, E.A. & Bulychev, V.A. (2002). Probability and statistics. Grades 5-9. Moscow: Drofa

[5] Corbalance, F. & Sants, H. (2014). Taming of chance. Probability theory. Moscow: De Agostini

[6] Corbalance, F. (2014). The Golden Section. Mathematical language of beauty. Moscow: De Agostini

[7] Depman, I.Ya. & Vilenkin, N.Ya. (1999). Behind the pages of the textbook of mathematics. Moscow: Enlightenment

[8] Duran, M. & Dökme, I. (2016). The effect of the inquiry-based learning approach on student's critical-thinking skills. EURASIA Journal of Mathematics, Science and Technology Education, 12(12), 2887-2908

[9] Eilks, I. (2015). Science Education and Education for Sustainable Development-Justifications, Models, Practices and Perspectives. EURASIA Journal of Mathematics, Science and Technology Education, 11(1), 149-158

[10] Episheva, O.B. & Krupich, V I. (1990). Teach schoolchildren to study mathematics: the formation of methods of educational activity. Moscow: Enlightenment

[11] Eremin, V.V. (2000). Mathematics in Chemistry. URL: http://www.chem.msu.su/rus/books/2010/lunin/eremin.pdf

[12] Federal state educational standards for general education (2012). The site of the Ministry of Education and Science of the Russian Federation. URL: http:///inobrynauky.rf/documents/543

[13] Firsov, V.V., Bokonev, O.A. & Shvartsburd, S.I. (1977). The state and prospects of facultative sessions in pomathematics. Moscow: Enlightenment

[14] Galkin E.V. (2005). Non-standard problems in mathematics. Tasks with integer numbers. Chelyabinsk: Vzglyad

[15] Galyan, S.V. (2014). The meta-subject approach in the education of schoolchildren. Surgut: RIO SurGPU

[16] Genkin, S.A., Itenberg, I.V. & Fomin, D.V. (1994). Leningrad Mathematical Circles. Kirov: "ASA" Publishing House

[17] Gevara, I. & Puig, K. (2014). Measuring the world. Calendars, measures of length and math. Moscow: De Agostini

[18] Gin, A. & Barkan, M. (2014). Open tasks as an instrument for the development of creative thinking. Moscow: Public education

[19] Gorev, P.M. (2011). The schoolchildren's integration with the experience of creative activity in mathematics through the system of tasks that realize integrative connections. Scientific and methodical electronic journal "Concept", 2. URL: http://e-koncept.ru/2011/11201.htm

[20] Gorev, P.M. (2013). The basic forms of organization of additional mathematical education in secondary school. Scientific and methodical electronic magazine "Concept", 5. URL: http://e-koncept.ru/2013/13116.htm

[21] Gorev, P.M. (2014). Improvement of the system of additional mathematical education in the secondary school. Scientific and methodical electronic journal "Concept", 11. URL: http://e-koncept.ru/2014/14298.htm

[22] Gorev, P.M. (2015). Directions of the improvement of school mathematical education. Mathematical bulletin of pedagogical universities and universities of the Volga-Vyatka region, 17, 224-236

[23] Gorev, P.M. & Utemov, V.V. (2011). The formula for creativity: we solve open problems. Kirov: VyatGGU

[24] Gorev, P. M. & Yachina, N. P. & Nurgaliyeva, A. K. (2015). Open Type Tasks In Maths as a Tool for Pupils' Meta-Subject Results Assessment. International Electronic Journal of Mathematics Education, 10(3), 211-220

[25] Gorev, P.M. & Luneeva, O.L. (2014). Intersubject projects of high school students: Mathematical and natural science cycles. Kirov: ICTSO Publishing House

[26] Grima, P. (2014). Absolute accuracy and other illusions. Secrets of statistics. Moscow: De Agostini

[27] Gromyko, Yu.V. (2001). Development of a new content of education and development of intellectual abilities of older schoolchildren. Formation of the scientific nature of the XXI century in education. Moscow: Pushkin Institute

[28] Guseev V. (1995). "Project method" as a special case of integrated learning technology. Director of the school, 4, 39-47

[29] Khutorskoy, A.V. (2016). Metaprojective approach in teaching. Moscow: Eidos Publishing House

[30] Kim, M.K. & Cho, M.K. (2015). Design and Implementation of Integrated Instruction of Mathematics and Science in Korea. EURASIA Journal of Mathematics, Science and Technology Education, 11(1), 3-15

[31] King, R. (red.) (1987). Chemical applications of topology and graph theory. Moscow: The World

[32] Kremer, N.Sh. (2002). Theory of Probability and Mathematical Statistics. Moscow: UNITY-DANA

[33] Laos-Beltra, R. (2014). The Mathematics of Life. Numerical models in biology and ecology. Moscow: De Agostini

[34] Navarro, H. (2014). Through the Looking Glass. Symmetry in mathematics. Moscow: De Agostini

[35] Nikolskaya, I. L. (1991). Optional course in mathematics. Moscow: Enlightenment

[36] Onchukova, L.V. (2001). Introduction to Logic. Logical operations. Kirov: VGPU

[37] Onchukova, L.V. (2002). Elements of Logic. Logical operations. Kirov: VGPU

[38] Perminov, E.A. (2004). Discrete mathematics. Ekaterinburg: IRRO

[39] Pichurin, L.F. (1999). Behind the pages of the textbook of algebra. Moscow: Education

[40] Rue, H. (2014). The art of counting. Combinatorics and enumeration. Moscow: De Agostini

[41] Sababha, B. H., Alqudah, Y. A., Abualbasal, A. & AlQaralleh, E. A. (2016). Project-Based Learning to Enhance Teaching Embedded Systems. EURASIA Journal of Mathematics, Science and Technology Education, 12(9), 2575-2585

[42] Selevko, G.K. (2006). Encyclopedia of educational technologies. Moscow: SRI school technology

[43] Semenov, E.E. (1999). Behind the pages of the textbook of geometry. Moscow: Enlightenment

[44] Sergeev, I.S. (2006). How to organize project activities of students. Moscow: ARKTI

[45] Shevkin, A.V. (2003). Textual problems. 7-11 classes. Moscow: Russian Word

[46] Shibasov, L.P. & Shibasova, Z. F. (1997). Behind pages of the textbook of mathematics: Mat. analysis. Theory of probability. Ancient. And take it. tasks. Moscow: Education

[47] Simonovskaya, G. A. (1997). Optional course "Complex numbers and their applications" for the senior classes of the secondary school: the author's abstract. Dis. cand. ped. sciences. Moscow

[48] Smirnova, I.M. & Smirnov, V.A. (2007). Curves. Course of choice. Grade 9. Moscow: Mnemosyna. The Concept of the Development of Mathematical Education in the Russian Federation. Rossiyskaya Gazeta. 2013. 27 December. URL: http://www.rg.ru/2013/12/27/matematika-site-dok.html

[49] Utemov, V.V. (2012). Development of the creativity of students in the main school: solving problems of an open type. Saarbrucken: Lambert Academic Publishing

[50] Utemov, V.V. & Zinovkina, M.M. & Gorev, P.M. (2013). Pedagogy of Creativity: Applied Course of Scientific Creativity. Kirov: ICTSO Publishing House

[51] Utemov, V.V. (2012). Development of creativity of primary school students by solving problems of "open" type: diss. cand. ped. sciences. Kirov

[52] Vilenkin, N. Ya., Shibasov, L. P. & Shibasova, Z. F. (1996). Behind the pages of the textbook of mathematics: Arithmetic. Algebra. Geometry. Moscow: Enlightenment

[53] Vylenkin, N.Ya. (1975). Popular combinatorics. Moscow: Nauka