experimental data via spreadsheets or code supports the development of scientific data analysis skills[3].

Platforms such as Arduino and other microcontrollers provide opportunities to merge physical experiments with programming, enabling the creation of real-world technical projects. Robotics, as an interdisciplinary field involving physics, computer science, and mathematics, contributes to the development of technical thinking. Project-based learning enables the application of knowledge across multiple disciplines, increasing student motivation and engagement. However, challenges remain in the implementation of interdisciplinary integration, including the lack of ready-made methodological frameworks and insufficient collaboration among educators. Teachers often face psychological and professional barriers, and misalignment in class schedules can hinder the organization of joint lessons and projects [4].

Addressing these issues requires the organization of interdisciplinary workshops and teacher training programs, along with the pre-planned development of integrated modules. Institutional support—both technical and motivational—is essential to the successful implementation of interdisciplinary initiatives.

The use of digital platforms such as Moodle and Google Classroom enhances the accessibility, flexibility, and personalization of the learning process. Additionally, free interactive platforms like PhET enrich the educational experience through visual, experimental, and data-driven approaches, encouraging students' inquiry-based learning.

Ultimately, this approach equips learners with the skills needed to thrive in a digital environment. By fostering 21st-century competencies—such as critical thinking, teamwork, digital literacy, and creativity—interdisciplinary education opens pathways toward scientific and professional futures [5].

Buketov University

References

[1] Adams, W. K., Paulson, A., Wieman, C. E. (2008). What levels of guidance promote engaged exploration with interactive simulations? AAPT Physics Education Research Conference Proceedings. https://doi.org/10.1119/perc.2008.pr.1

[2] Perkins, K., Loeblein, P., Dessau, L. (2010). PhET: Interactive simulations for science and math. The Physics Teacher, 48(4), 225–227. https://doi.org/10.1119/1.3361987

[3] Brennan, K., Resnick, M. (2012). New frameworks for studying and assessing the development of computational thinking. Proceedings of the 2012 Annual Meeting of the American Educational Research Association.

[4] Grover, S., Pea, R. (2013). Computational Thinking in K–12: A review of the state of the field. Educational Researcher, 42(1), 38–43. https://doi.org/10.3102/0013189X12463051

[5] Arduino. (n.d.). Arduino Project Hub. Retrieved from https://create.arduino.cc/projecthub

NON-STANDARD PROBLEMS IN MATHEMATICS

Syzdykova Nazym Kosarbekovna[1], **Yessenbayeva Gulsim Akhmadievna**[2], **Akhmanova Danna Maratovna**[3], **Beisenova Danagul Rymbaevna**[4]

[1]Academician Ye.A.Buketov Karaganda University, Karaganda, Kazakhstan

[1]E-mail: s_nazym_1807@mail.ru

Mathematical knowledge and skills are playing an increasingly important role in our daily lives. Problem solving is the basis of teaching mathematics at all levels of mathematical education. One of the goals of mathematics education is for students to solve non-standard problems. Non-standard problems are the main component of mathematical education. To solve non-standard problems, students do not have enough knowledge. They need to solve a mathematical problem and find a way, a method of solution, while showing ingenuity and ingenuity [1]. The procedure for solving a non-standard problem is usually unknown, and the student is looking for a way to the result, often in an original way. Therefore, solving non-standard problems requires deep concentration, ingenuity and time.

An important part of working with non-standard tasks is to motivate and arouse interest in the issue that the tasks represent. Non-standard tasks motivate students, opening up new skills for them and developing their creativity. Non-standard tasks in mathematical education are aimed at developing logical and combinatorial thinking of students. They develop ingenuity and ingenuity. Solving non-standard tasks and problems focuses on the assessment of skills, not knowledge, they emphasize the connection between the school curriculum and real situations that students encounter in everyday life.

Non-standard tasks in mathematical education do not mean tasks of increased complexity. These are unusual tasks and they are suitable for the research activities of students. Non-standard tasks are usually not included in the curriculum and are not found in school textbooks. In grades 5-7 in the school mathematics course, students consider non-standard problems for Euler circles, transfusion and weighing. During optional classes with students, it is possible to solve problems on the application of the truth table, to solve problems solved by the method of tables, the method from the end, the method by the direct method. These tasks make it possible to develop an interest in mathematics as a science, which develops into an interest in the very process of thinking activity, in new knowledge.

Let's consider the problem of using truth tables. The essence of the method is to compile a table in which 1s and 0s are placed, depending on the truth or falsity of the statement. At the Mathematics Olympiad, students of Aleks, Viktor, Mikle and Denis took the first four places.

When asked how the places were distributed, they gave the answers: Denis - second or Viktor - third; Mikle – the first or Aleks – the fourth; Denis is the first or the Viktor is the second. What place did the children take if in each answer only one statement is true and the other is false?

To solve the problem, let's make a truth table (see table 1):

1 answer		2 answer		3 answer	
D2	V3	M1	A4	D1	V2

Table 1: Answer options

In Table 1, the expressions D2, B3 correspond to the answer "Denis is the second or Viktor is the third". Let us note the true statement 1, and the false statement 0.

Let's consider 1 answer. Let the expression "Denis is the second"be true, and the expression "Viktor is the third"be false. If D2 is true, then in answer 3 D1 is false. This means that V2 is true (see Table 2).

Buketov University

1 answer		2 answer		3 answer	
D2	V3	M1	A4	D1	V2
1	0	1	0	0	1

Table 2: Answer options and their meanings

We got a contradiction, since Denis and Viktor took 2st place. Hence, D2 is true, V3 is falsely impossible.

Let us again make a truth table, but now suppose that D2 is false, then according to the condition of the problem V3 it is true. Reasoning, we get the following table 3:

1 answer		2 answer		3 answer	
D2	V3	M1	A4	D1	V2
0	1	0	1	1	0

Table 3: Answer options and their meanings

In this table, the conditions of the problem are met, the solution has been obtained. From Table 3 we get that Denis took 1st place, Mikle – 2nd place, Viktor – 3rd place, Aleks – 4th place. This will be the answer to this non-standard task.

As you can see, non-standard tasks in mathematics:

- develop logical and combinatorial thinking of students,
- support the perception of spatial relationships of students and indicate the connection between mathematics and everyday life,
- arouse interest in mathematics,
- the solution of these problems does not always depend on the knowledge and skills of school mathematics,
- these tasks are aimed at activating students in mathematics.

The systematic use of non-standard tasks contributes to the development of students' ingenuity, the development of logical thinking. Students' reasoning becomes consistent and logical. Students become more interested in mathematics, they begin to think out of the ordinary, analyze and apply knowledge in non-standard situations in real life.

Buketov University

References

[1] Дрозина В.В., Дильман В.Л. Механизм творчества решения нестандартных задач. М.: БИНОМ. Лаборатория знаний, 2012, 255с.

SECURITY ISSUES AND MAIN IMPLEMENTATION OF CORPORATE INFORMATION SYSTEMS

Yeleussiz M.Y.[1], **Khasanova A.B.**[2], **Dakarim G.K.**[3], **Datkabaeva M.A.**[4]

[1,2,3,4]Ye.A. Buketov Karaganda University, Karaganda, Kazakhstan
[1]E-mail: erzhanovna18@bk.ru