2026-yil
8-son

# FAN VA TA’LIM YANGILIKLARI

ILMIY - METODIK

# JURNALI

saen.uz

FAN VA TA'LIM YANGILIKLARI
JURNALI

2026-yil
8-son

**Bosh muharrir:**
Shoumarov G‘ayrat Bahromovich, psixologiya fanlari doktori, akademik

**Bosh muharrir o‘rinbosari:**
Qodirov Umarali Do‘stqobilovich, psixologiya fanlari doktori (DSc), professor

**Mas’ul kotib:**
Muqimov Alisher

**Texnik muharrir:**
Qarshiyev Jamshid Murotaliyevich, pedagogika fanlari bo‘yicha falsafa doktori (PhD), dotsent v.b.

**TAHRIR HAY’ATI:**

**01.00.00 – FIZIKA-MATEMATIKA FANLARI**
*Ayupov Shavkat Abdullayevich, fizika-matematika fanlari doktori, akademik*
*A’zamov Abdulla, fizika-matematika fanlari doktori, akademik*
*Zohidov Erkin A’zamovich, fizika-matematika fanlari doktori, professor*

**02.00.00 – KIMYO FANLARI**
*Normaxamatov Nodirali Soxobataliyevich, kimyo fanlar doktori, professor*
*Tojibayev Komiljon Sharobitdinovich, kimyo fanlar doktori, akademik*

**03.00.00 – BIOLOGIYA FANLARI**
*Abdurahmonov Ibrohim Yo‘lchiyevich, biologiya fanlari doktori, akademik*
*Sulaymonov Botirjon Abdushukurovich, biologiya fanlari doktori, akademik*

**04.00.00 – GEOLOGIYA-MINERALOGIYA FANLARI**
*Fayziyev Abdulhaq Radjabovich, geologiya-mineralogiya fanlari doktori, professor*
*Husanov Sultonboy To‘xtayevich, geologiya-mineralogiya fanlari doktori, professor*

**05.00.00 – TEXNIKA FANLARI**
*Allayev Qahramon Rahimovich, texnika fanlari doktori,* akademik
*Majidov Inom Urishevich, texnika fanlari doktori, professor*
*Turobjonov Sadritdin Maxamatdinovich, texnika fanlari doktori,* akademik
*Shaumarov Said Sanatovich, texnika fanlari doktori, professor*

**06.00.00 – QISHLOQ XO‘JALIGI FANLARI**
*Namozov Shodmon Ergashovich, qishloq xo‘jaligi fanlari doktori, akademik*
*Shoumarov Hikmat Bahromovich, qishloq xo‘jaligi fanlari nomzodi, professor*

**07.00.00 – TARIX FANLARI**
*Ziyo Azamat Hamid o‘g‘li, tarix fanlari doktori, akademik*
*Sagdullayev Anatoliy Sagdullayevich, tarix fanlari doktori, akademik*
*Yusupova Diloram Yunusovna, tarix fanlari doktori, akademik*

**08.00.00 – IQTISODIYOT FANLARI**
*Abdurahmonov Qalandar Xodjayevich, iqtisod fanlari doktori, akademik*
*Musayev Behzod Anvarovich, iqtisod fanlari nomzodi*
*To‘xliyev Nurislom, iqtisod fanlari doktori, akademik*
*G‘ulomov Saidahror Saidahmedovich, iqtisod fanlari doktori, akademik*

**09.00.00 – FALSAFA FANLARI**
*Nazarov Qiyom Normirzayevich, falsafa fanlari doktori, professor*
*Saifnazarov Ismoil Saifnazarovich, falsafa fanlari doktori, professor*

**10.00.00 – FILOLOGIYA FANLARI**
*Mengliyev Baxtiyor Rajabovich, filologiya fanlari doktori, professor*
*Sirojiddinov Shuhrat Samariddinovich, filologiya fanlari doktori, akademik*
*Xidirov Rajab Gulmatovich, filologiya fanlari nomzodi, dotsent (Tojikiston)*

**11.00.00 – GEOGRAFIYA FANLARI**
*Nigmatov Asqar Nigmatullayevich, geografiya fanlari doktori, professor*
*Tojiyeva Zulxumor Nazarovna, geografiya fanlari doktori, professor*

**12.00.00 – YURIDIK FANLAR**
*Rustamboyev Mirzayusuf Hakimovich, yuridik fanlar doktori, professor*
*Saidov Akmal Xolmatovich, yuridik fanlar doktori, akademik*
*Xolmo'minov Jumanazar Toshtemirovich, yuridik fanlar doktori, professor*
*Qodirov Bobiromon Bekmurodovich, yuridik fanlar doktori, professor*

**13.00.00 – PEDAGOGIKA FANLARI**
*Djurayev Risboy Haydarovich, pedagogika fanlari doktori, akademik*
*Ibraimov Xolboy, pedagogika fanlari doktori, akademik*
*Musurmonova Oynisa, pedagogika fanlari doktori, professor*
*Umarov Bahrom Norboyevich, pedagogika fanlari bo'yicha falsafa doktori, dotsent*

**14.00.00 – TIBBIYOT FANLARI**
*Akilov Xabibulla Ataullayevich, tibbiyot fanlari doktori, professor*
*Nazirov Feruz Gafurovich, tibbiyot fanlari doktori, akademik*

**15.00.00 – FARMATSEVTIKA FANLARI**
*Abdullabekova Viloyat Nurillabekovna, farmatsevtika fanlari doktori, professor*
*Tulaganov Abduqodir Abdurahmonovich, farmatsevtika fanlari doktori, professor*

**16.00.00 – VETERINARIYA FANLARI**
*Daminov Asadullo Suvonovich, veterinariya fanlari doktori, professor*
*Jabborov Shuhrat Abdumajidovich, veterinariya fanlari doktori, professor*
*G'afurov Aktam G'afurovich, veterinariya fanlari doktori, professor*

**17.00.00 – SAN'ATSHUNOSLIK FANLARI**
*Ahmedova Nigora Rahimovna, sanatshunoslik fanlari doktori, professor*
*Hakimov Akbar Abdullayevich, san'atshunoslik fanlari doktori, akademik*

**18.00.00 – ARXITEKTURA**
*Nozilov Dodo Avazovich, arxitektura fanlari doktori, professor*
*Uralov Axtam Sindarovich, arxitektura fanlari doktori, professor*

**19.00.00 – PSIXOLOGIYA FANLARI**
*Abdusamatov Hasanboy Usmonjon o'g'li, psixologiya fanlari doktori, professor*
*Barotov Sharif Ramazonovich, psixologiya fanlari doktori, professor*
*Karimova Vasila Mamanosirovna, psixologiya fanlari doktori, professor*
*Halimova Mashraboy Vohidovna, psixologiya fanlari doktori, professor*
*Lazar Drajeta, psixologiya fanlari doktori, professor, Belgrad, Serbiya*
*Karpinskiy Konstantin Viktorovich, psixologiya fanlari doktori, professor, Grodno, Belarussiya*
*Suletbayeva Ella Serikbayevna, psixologiya fanlari doktori, dotsent*

**22.00.00 – SOTSIOLOGIYA FANLARI**
*Bekmurodov Mansur Bobomurodovich, sotsiologiya fanlari doktori, professor*
*Toshmuhamedova Dilorom Gafurdjanovna, sotsiologiya fanlari doktori*

**23.00.00 – SIYOSIY FANLAR**
*Fayzullayev Alisher Omonullayevich, siyosiy fanlar doktori, professor*
*Hasanov Otabek Abdurashidovich, siyosiy fanlar doktori*
*Paxrutdinov Shukritdin Ilyasovich, siyosiy fanlar doktori, professor*
*Omonov Baxtiyor Axtamovich, siyosiy fanlar doktori, professor*
*Quronboyev Qahramon Qo'chqorovich, siyosiy fanlar doktori, professor*
*Avazov Komil Xolliyevich, siyosiy fanlar bo'yicha falsafa doktori*

**24.00.00 – ISLOMSHUNOSLIK FANLARI**
*Ibrohimov Ne'matulla, filologiya fanlari doktori, akademik*
*Islomov Zohidjon Mahmudovich, filologiya fanlari doktori, professor*

FAN VA TA'LIM YANGILIKLARI
JURNALI
2026-yil
8-son

UDK 372.857

**Ibodova Mahfuza Namozovna,**
Associate Professor, Department of Biology
Navoi State University

# METHODOLOGY FOR USING COOPERATIVE LEARNING TECHNOLOGY IN BIOLOGY LESSONS

**Abstract.** This article provides a theoretical and practical analysis of the methodology for using cooperative learning technology in biology lessons. It examines the didactic essence of cooperative learning, the application of strategies such as Jigsaw, Think-Pair-Share, RBCL, and STAD in biology lessons, their integration with the integrative-biology.uz web-based platform, and the results of a pedagogical experiment presented on the basis of statistical data.

**Keywords:** cooperative learning, biology education, Jigsaw, Think-Pair-Share, RBCL, STAD, group work, academic lyceum.

# BIOLOGIYA DARSLARIDA HAMKORLIKDA O‘QITISH TEXNOLOGIYASIDAN FOYDALANISH METODIKASI

**Annotatsiya.** Mazkur maqolada biologiya darslarida hamkorlikda o‘qitish texnologiyasidan foydalanish metodikasi nazariy va amaliy jihatdan tahlil qilingan. Unda hamkorlikda o‘qitishning didaktik mohiyati, biologiya darslarida Jigsaw, Think-Pair-Share, RBCL va STAD kabi strategiyalardan foydalanish, ularni integrativ-biology.uz veb-platformasi bilan integratsiyalash hamda pedagogik tajriba natijalari statistik ma’lumotlar asosida yoritilgan.

**Kalit so‘zlar:** hamkorlikda o‘qitish, biologiya ta’limi, Jigsaw, Think-Pair-Share, RBCL, STAD, guruhli ish, akademik litsey.

# МЕТОДИКА ИСПОЛЬЗОВАНИЯ ТЕХНОЛОГИИ КООПЕРАТИВНОГО ОБУЧЕНИЯ НА УРОКАХ БИОЛОГИИ

**Аннотация.** В данной статье представлен теоретический и практический анализ методики использования технологии кооперативного обучения на уроках биологии. Рассматриваются дидактическая сущность кооперативного обучения, применение таких стратегий, как Jigsaw, Think-Pair-Share, RBCL и STAD, на уроках биологии, их интеграция с веб-платформой integrative-biology.uz, а также результаты педагогического эксперимента, представленные на основе статистических данных.

**Ключевые слова:** кооперативное обучение, биологическое образование, Jigsaw, Think-Pair-Share, RBCL, STAD, групповая работа, академический лицей.

**Introduction** The modern educational paradigm requires transforming the student from a passive object of learning into an active subject of it. One of the effective means of accomplishing this is cooperative learning technology. Cooperative learning is a pedagogical approach in which students work together in small groups, influence one another in pursuit of a shared goal, and share collective responsibility, together with individual accountability, for the final outcome [1].

Because biology is by nature a practice-oriented subject requiring observation, experimentation, data analysis, and drawing conclusions, it offers favorable conditions for introducing cooperative learning strategies [2]. International research indicates that students who work in cooperative groups achieve higher academic results than those who work individually, and that their social-emotional skills also develop more effectively [3].

The purpose of this article is to develop a methodological system for using cooperative learning technology in biology lessons, to integrate it with the capabilities of a modern web-based platform, and to substantiate its effectiveness through the results of a pedagogical experiment.

The relevance of this topic lies in the fact that, under the traditional "teacher-to-class" model, most students remain passive listeners, which prevents the full development of their activity- and thinking-related skills. Cooperative learning technology, by contrast, turns every student into an active participant in the learning process, in which knowledge is transmitted not only from teacher to student but also from student to student. This serves to promote a deep and lasting mastery of knowledge, particularly in subjects such as biology that require understanding and analysis [1; 3].

## Theoretical and Methodological Foundations of Cooperative Learning

The theory of cooperative learning is grounded in the ideas of social constructivism, according to which knowledge is constructed not individually but through processes of social interaction [4]. Vygotsky's concept of the "zone of proximal development" forms the theoretical foundation of cooperative learning: through collaboration with peers, a student is able to perform tasks that they would be unable to accomplish alone [5].

Organizing cooperative learning effectively requires adherence to five core principles: positive interdependence, individual and group accountability, direct interaction, the development of social skills, and regular reflection on group functioning [6]. Where these principles are disregarded, group work risks becoming mere "sitting together" rather than genuine cooperation — that is, a superficial form of group activity [7].

Unlike traditional group work, cooperative learning is carefully structured, with each student's task, responsibility, and assessment criteria clearly defined. It is precisely this structured character that constitutes the principal factor underlying the high effectiveness of cooperative learning [8].

Another important aspect of applying cooperative learning technology in biology lessons is the development of scientific thinking in students. Understanding biological phenomena often requires processes such as observation, comparison, hypothesis formulation, and hypothesis testing. In a group setting, students are compelled to listen to, analyze, and justify their positions in relation to one another's views, which fosters the development of critical thinking [3; 6]. Moreover, the sense of "positive interdependence" that arises during cooperative learning helps students feel responsible not only to themselves but to the group as a whole — an important factor in developing a culture of collaborative work over the long term.

**Cooperative Learning Strategies Applied in Biology Lessons**

A number of cooperative strategies are applied effectively in the practice of teaching biology. The most widely used of these are described below.

The Jigsaw method — a complex topic is divided into several parts, with each group member studying their part in depth within an "expert group" before returning to the home group to teach the material to the others. This method, for example, is applied effectively when studying the topic "Types of Ecosystems," with each expert group working separately on a particular ecosystem (forest, desert, aquatic, tundra).

The Think-Pair-Share technique — the teacher poses a problem-based question; students first think individually, then discuss it in pairs, and finally share their conclusions with the whole class. This technique makes it possible to actively engage all students within a short period of time.

STAD (Student Teams-Achievement Divisions) — students are divided into small, heterogeneous teams that study a topic together, after which each student takes an individual test; team results are calculated on the basis of each member's improvement relative to their own prior performance. This method encourages both stronger and weaker students to collaborate successfully within the same team.

RBCL (Research-Based Collaborative Learning) — students carry out small research projects in groups, gathering and analyzing data and defending their results in the form of a presentation. In biology lessons, this method is applied, for example, in projects investigating local biological diversity.

The Round Robin technique — group members take turns sharing their views, which guarantees the participation of every student in the discussion.

In selecting among the strategies listed above, teachers should take into account the objective of the lesson, the complexity of the topic, and the level of student preparedness. For instance, the Jigsaw method tends to be most effective for studying new and complex topics, Think-Pair-Share for rapidly reinforcing knowledge, and the RBCL approach for long-term project work. Alternating among

strategies also prevents students from becoming accustomed to a single method and helps develop their adaptability.

**Integrating Cooperative Learning with the Web-Based Platform** In contemporary conditions, combining cooperative learning strategies with digital tools further enhances their effectiveness. Within this study, the breakout rooms, shared documents, and online presentation tools of the integrative-biology.uz platform were used as the technical environment for implementing cooperative strategies.

In organizing the Jigsaw method through the platform, a separate virtual room is allocated for each "expert group" containing materials, videos, and tests related to the corresponding subtopic. After working in their expert room, students return to the home group room and present their acquired knowledge to the others through a shared document on the platform . The Think-Pair-Share technique is implemented through the platform's "problem-based question" module, while STAD is implemented through group rankings and an individual progress tracker.

Such integration allows teachers to monitor the activity of each group and each student in real time and to intervene promptly when necessary. In addition, the platform's automated reporting system facilitates the rapid analysis of group work results and formative assessment.

At the same time, transferring cooperative learning to a digital environment presents a number of practical challenges. These include the fact that not all students have stable internet access, that some students lack sufficient digital skills, and the need to prevent "free-riding" within groups, whereby certain members shift the workload onto others. To address these challenges, it is recommended that teachers assign each student a clear, individual task, make regular use of the platform's progress tracker, and periodically rotate roles within the group

**Structure of a Cooperative Lesson and Methodological Stages** Organizing a biology lesson on the basis of cooperative learning technology comprises the following stages:

***Table 1.***

***Structure of a lesson based on cooperative learning technology***

| No. | Stage | Content |
|---|---|---|
| 1 | Preparation | Dividing students into heterogeneous groups and announcing the objective and assessment criteria. |
| 2 | Group work | Group members jointly completing the assignment according to the selected strategy (Jigsaw, STAD, etc.). |

| No. | Stage | Content |
|---|---|---|
| 3 | Presentation | Groups presenting their results to the class or through the platform. |
| 4 | Assessment | Determining results on the basis of individual and group assessment criteria. |
| 5 | Reflection | Jointly analyzing group performance and identifying strengths and weaknesses. |

*Table 1. Structure of a lesson based on cooperative learning technology*

The reflection stage is often overlooked, yet it is essential to the long-term effectiveness of cooperative learning. At this stage, students analyze not only the knowledge they have acquired but also the interpersonal dynamics of their group work, which serves to improve their future collaborative activity.

**Results of the Pedagogical Experiment** To determine the effectiveness of the developed methodology, a pedagogical experiment was conducted in four academic lyceums in Navoi region (the academic lyceums of NavSU, TSTU, TIFI, and QSU). A total of 581 students took part in the study and were divided into experimental and control groups.

In the experimental groups, cooperative learning technology was combined with the web-based platform, while the control groups followed the traditional frontal teaching method. The results showed that the knowledge-quality indicator in the experimental groups was 12.5 percentage points higher than in the control groups . The chi-square ($\chi^2$) test was used to verify statistical reliability; the computed value was $\chi^2 = 50.87$, which exceeds the critical table value, indicating that the observed differences are statistically reliable ($p < 0.05$).

Observations made during the experiment showed that students who worked in cooperative groups improved not only in knowledge quality but also markedly in communicative skills, mutual respect, and sense of responsibility. In addition, a survey of teachers noted that integrating cooperative strategies with the web-based platform considerably simplified the monitoring and assessment of group work.

A separate analysis of the distribution of achievement levels between the experimental and control groups revealed a marked increase in the proportion of students at high and average achievement levels in the experimental groups, with a corresponding decrease in the proportion at the low achievement level. It was further noted that students' classroom engagement (asking questions, participating in discussion) was considerably higher in the experimental groups than in the control groups, confirming that cooperative learning has a positive effect not only cognitively but also motivationally.

**Conclusion**

In conclusion, the use of cooperative learning technology in biology lessons represents an effective means of developing not only students' subject-matter knowledge but also their social and communicative skills. The application of strategies such as Jigsaw, Think-Pair-Share, STAD, and RBCL, combined with the capabilities of a modern web-based platform, substantially improves the quality of the instructional process.

The results of the pedagogical experiment (a 12.5% effectiveness indicator and $\chi^2 = 50.87$) confirmed the scientific and practical soundness of the developed methodology. Investigating the potential for applying cooperative learning strategies to the teaching of other natural science subjects remains a pressing task for future research.

**References**

1. Johnson D.W., Johnson R.T. Cooperation and Competition: Theory and Research. – Edina: Interaction Book Company, 1989. – 216 p.

2. Slavin R.E. Cooperative learning: Theory, research, and practice. – 2nd ed. – Boston: Allyn & Bacon, 1995. – 174 p.

3. Tolipova J.O., Usmonov B.Sh. Biologiya ta'limida innovatsion texnologiyalar. – Toshkent: Fan va texnologiya, 2022. – 184 b.

4. Ibodova M.N. Conceptual framework for the use of integrative technologies for teaching biological sciences in academic lyceums . European Journal of Research and Reflection in Educational Sciences. – 2023. – Vol. 11, No. 4. – P. 52–55. – URL: https://www.idpublications.org/ejrres-vol-11-no-4-2023

5. Ibodova M.N. An Integrative Approach and The Methodology of Organizing Binary Lessons in Biology Education The American Journal of Applied Sciences. – 2026. – Vol. 8, Issue 06. – P. 288–296. – URL: https://doi.org/10.37547/tajas/Volume08Issue06-09

6.Ibodova M.N. Improving the Effectiveness of Integrative Technologies in Teaching Biology at Academic Lyceums. The American Journal of Applied Sciences. – 2026. – Vol. 8, Issue 06. – P. 268–280. – URL: https://doi.org/10.37547/tajas/Volume08Issue06-07

7.Ibodova M.N. Methodological foundations of the use of integrative technologies in the teaching of biology in academic lyceums . Journal of Advanced Zoology. – Hindiston, 2023. – Vol. 44, Issue S-6. – P. 1786–1789.

URL: http:// www.jazindia .com/index.php/jaz/article/view/2618

8. Ibodova M.N. Description of integrative technologies for teaching biology in academic lyceums // Current Research Journal of Pedagogics. – 2024. – Vol. 5, Issue 10. – P. 189–192. – DOI: https://doi.org/10.37547/pedagogics-crjp-05-10-32.

FAN VA TA'LIM YANGILIKLARI
JURNALI

2026-yil
8-son

**Muassis - "FAN VA INNOVATSIYA YANGILIKLARI" MCHJ**
**Jurnal hamkori - «PROFI UNIVERSITY»**

**Jurnal O'zbekiston Respublikasi Prezidenti Administratsiyasi huzuridagi axborot va ommaviy kommunikatsiyalar agentligi tomonidan 2024-yil 24-may kuni № 454068-sonli guvohnoma bilan ro'yxatga olingan.**

Jurnal 2024-yilda tashkil etilgan, 1 oyda bir marta o'zbek, tojik, qozoq, qirg'iz, qoraqalpoq, rus va ingliz tillarida nashr etiladi.

Tahririyat manzili: 190110, Toshkent shahri Uchtepa tumani, Bog'iston MFY, 14-mavze, 8-uy.

Telefonlar: +998 90 749 00 00
+998 90 749 77 77
+998 91 902 05 01
**E-mail:** saen_2024@mail.ru
**Jurnal sayti:** www.saen.uz
**Telegram kanali:** **https://t.me/saen_2024**

**Maqolada keltirilgan fakt va ma'lumotlarning to'g'riligi uchun mualliflar mas'uldirlar.**

"Fan va ta'lim yangiliklari" ilmiy-amaliy jurnali Oliy attestatsiya komissiyasi Rayosatining qarori (25.08.2025 y., №374/5) bilan pedagogika va psixologiya fanlari bo'yicha falsafa doktori (PhD) va fan doktori (DSc) ilmiy darajasiga talabgorlarning dissertatsiyalari asosiy ilmiy natijalarini chop etish tavsiya etilgan milliy ilmiy nashrlar ro'yxatiga kiritilgan.

**ISSN:** 3093-8694