



SEMIOTIK VA PSIXOLINGVISTIK YONDASHUVLAR ASOSIDA BOSHLANG'ICH SINIF DARSЛИKLARI VIZUAL KODINI LOYIHALASH METODIKASI

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Annotatsiya: Mazkur maqolada boshlang'ich sinf darsliklarining vizual kodini semiotik va psixolingvistik yondashuvlar asosida loyihalash masalalari yoritiladi. Darsliklardagi rasm, rang, belgi, diagramma, shrift va sahifa kompozitsiyasining o'quvchi tomonidan axborotni qabul qilish, anglash va xotirada saqlash jarayonlariga ta'siri tahlil qilinadi. Vizual elementlarning faqat bezak vazifasini emas, balki mazmunni ifodalash, bilimlarni tizimlashtirish va o'quv faoliyatini boshqarish vazifalarini ham bajarishi asoslanadi. Shuningdek, boshlang'ich ta'lim darsliklari uchun vizual kodni tanlash, ishlab chiqish, sinovdan o'tkazish va takomillashtirish bosqichlarini qamrab olgan metodik model taklif etiladi.

Kalit so'zlar: semiotika, psixolingvistika, boshlang'ich ta'lim, darslik dizayni, vizual kod, vizual savodxonlik, kognitiv yuklama, infografika, multimodal ta'lim, idrok, xotira.

МЕТОДОЛОГИЯ РАЗРАБОТКИ ВИЗУАЛЬНОГО КОДА УЧЕБНИКОВ ДЛЯ НАЧАЛЬНОЙ ШКОЛЫ НА ОСНОВЕ СЕМИОТИЧЕСКОГО И ПСИХОЛИНГВИСТИЧЕСКОГО ПОДХОДОВ

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Аннотация: В данной статье рассматриваются вопросы разработки визуального кода учебников для начальной школы на основе семиотического и психолингвистического подходов. Анализируется влияние изображений, цветов, символов, диаграмм, шрифтов и композиции страниц в учебниках на процессы восприятия, понимания и запоминания информации учащимся. Утверждается, что визуальные элементы выполняют не только декоративную функцию, но и функции выражения содержания, систематизации знаний и управления образовательной деятельностью. Также предлагается методологическая модель, охватывающая этапы отбора, разработки, тестирования и совершенствования визуального кода для учебников начальной школы.

Ключевые слова: семиотика, психолингвистика, начальное образование, дизайн учебников, визуальный код, визуальная грамотность, когнитивная нагрузка, инфографика, мультимодальное образование, восприятие, память.

A Methodology for Designing the Visual Code of Primary School Textbooks Based on Semiotic and Psycholinguistic Approaches

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Abstract: This article explores the design of the visual code in primary school textbooks, drawing upon semiotic and psycholinguistic approaches. It analyzes how



images, colors, symbols, diagrams, fonts, and page layouts within textbooks influence the processes by which students receive, comprehend, and retain information. The study argues that visual elements serve functions beyond mere decoration; they also express content, organize knowledge, and guide learning activities. Furthermore, a methodological model is proposed for the selection, development, testing, and refinement of visual codes for primary education textbooks.

Keywords: semiotics, psycholinguistics, primary education, textbook design, visual code, visual literacy, cognitive load, infographics, multimodal learning, perception, memory.

Introduction.

In modern education, a textbook is more than just a simple source for presenting educational information. It functions as a complex communicative system that organizes knowledge through text, images, color, symbols, tables, and other graphical elements. The visual organization of a textbook is particularly important for primary school students, as this is a stage characterized by the active development of reading skills, attention management, concept formation, and figurative thinking.

While images in a textbook can facilitate the understanding of a topic, illustrations that are irrelevant to the content or subject to misinterpretation may distract the learner from key information. Therefore, when selecting visual materials, it is essential to consider not only aesthetic requirements but also semantic clarity, age-related characteristics, and the principles of information processing. Research on multimedia-based learning indicates that the alignment between text and images, the visual highlighting of key components, and the reduction of extraneous elements all influence learning effectiveness [1; 2]. Maqolaning dolzarbligi boshlang'ich sinf darsliklaridagi vizual vositalarni tasodifiy bezaklar sifatida emas, balki muayyan ma'no va pedagogik vazifaga ega kodlar tizimi sifatida loyihalash zarurati bilan belgilanadi.

Developing criteria for selecting the primary visual elements of a textbook.

Proposing stages for the design and evaluation of a visual code.

1. Semiotic foundations of visual code design.

Semiotics is the study of signs, their structure, meaning, and communicative functions. In the context of a textbook, a visual code is a system of signs that—in conjunction with the text—represents information and helps the learner grasp specific meanings. This system encompasses images, pictograms, colors, lines, arrows, tables, maps, and graphical forms.

Ferdinand de Saussure's perspectives on the sign facilitate an understanding of the relationship between the sign's expressive form and the content it signifies [3]. Meanwhile, in the classification proposed by Charles Sanders Peirce, signs are categorized into types such as icons, indices, and symbols [4]. Applying these theoretical perspectives to textbook design enables a systematic analysis of the meanings conveyed by visual elements.

Iconic signs convey meaning based on an external resemblance to the object they represent; for instance, an image of an animal helps in identifying that specific animal. Indexical signs indicate a causal, spatial, or other direct connection—for example, an arrow linking the stages of a process signifies movement or a sequence.



Symbolic signs, meanwhile, carry meanings established by convention or cultural context; examples include mathematical operation symbols, certain directional pictograms, and conventional map symbols.

This classification is useful for determining the function of each visual element within a textbook. In a mathematics textbook, for example, representing a number through images of objects constitutes an iconic approach; using an arrow to show the connection between operations serves as an index; and employing the “+” sign represents a symbolic expression.

A visual code designed based on a semiotic approach must meet the following requirements:

Semantic clarity: A sign must, first and foremost, convey the intended meaning.

Consistency: The same sign or color convention should be applied throughout the textbook for the same function.

Cultural appropriateness: Visuals must be suitable for the learner’s sociocultural background and age.

Alignment with the text: An image should complement or explain the information in the text, or otherwise facilitate comprehension.

Absence of extraneous meaning: Decorative elements should not compete with the core content. Thus, the essence of semiotic design lies not merely in the use of images, but in the deliberate pre-determination of the function and content of each visual sign.

2. Psycholinguistic approach and learner perception.

Psycholinguistics examines the mental processes involved in understanding language, processing speech, comprehending word meanings, and storing information in memory. In the design of primary school textbooks, this approach allows for consideration of how a student perceives the relationship between written text, images, and symbols.

For a primary school student, a new concept is often more easily grasped when linked to a concrete object, action, or real-life situation. For instance, an illustration of apples or blocks in a math problem can help the student understand the relationships between numbers. However, it is essential that the image accurately represents the relationship described in the text, ensuring the student does not misinterpret the conditions of the problem.

According to the theory of multimedia learning, when words and meaningful images complement each other, students are better able to select, organize, and integrate information [1]. Conversely, excessive decorative elements, unnecessary colors, or images disconnected from the text can increase cognitive load [2]. From a psycholinguistic perspective, the following factors are taken into account when designing the visual code of a textbook:

Directing attention. An important concept can be highlighted through color, framing, size, or placement. However, emphasizing too many elements on a single page blurs the distinction between primary and secondary information.

Understanding meaning. An image should reveal the content of a new word or concept to the learner. The image chosen to explain an unfamiliar concept should not itself be so complex that it requires further explanation.



Retention. A meaningful connection between text and imagery can help the learner remember information and recall it later.

Language development. Tasks such as constructing a story based on an image, recounting a sequence of events, or comparing objects help develop oral language skills.

Managing cognitive load. It is advisable to avoid presenting too many images, instructions, or blocks of text simultaneously; instead, tasks should be broken down into smaller, manageable steps. Thus, the psycholinguistic approach links visual codes to the learner's perception, language comprehension, and knowledge acquisition.

3. Methodology for Designing the Visual Code of Primary School Textbooks

A methodology that integrates semiotic and psycholinguistic approaches can be implemented based on the following stages.

3.1. First Stage – Pedagogical and Audience Analysis.

First, the subject, grade level, learning objectives, and the students' level of preparation for the textbook are determined. While images and large symbols used to teach letters are essential in the first grade, the scope for using diagrams, tables, maps, and schematics expands in higher grades.

At this stage, answers to the following questions are sought:

What knowledge or skills should the student acquire?

Which concepts can be explained using an image?

Which words and symbols are the students already familiar with?

Which visual aid might lead to a misunderstanding of the content?

3.2. Second Stage – Developing a System of Visual Codes

Consistent visual rules are established for all sections of the textbook. For example, a specific icon might be used for tasks, a uniform method for highlighting new concepts, arrows to indicate sequences, and a distinct symbol for independent work.

When using color, the color itself should not be the sole carrier of meaning. Important distinctions should be indicated not only by color but also through text, shape, or icons. This ensures the material remains accessible even to students who perceive colors differently.

3.3. Third Stage – Coordinating Text and Images.

The contribution of each image to the educational objective is evaluated. An image should be placed directly next to the relevant text; its content must be clear and serve to elucidate the core concept.

For instance, in natural sciences, a sequence of images combined with directional indicators can be used to illustrate the growth stages of a plant. In a native language textbook, establishing a connection between a word and an image of the corresponding object helps explain the meaning of a new term.

3.4. Fourth stage – designing the page layout.

The page layout must take into account where the student's gaze begins, what information is encountered first, and what should be focused on next. A visual hierarchy is established among the heading, main text, images, questions, and independent assignments.



Factors such as font readability, line spacing, the contrast between text and background, and the use of white space on the page are also significant. Text and images that are packed too tightly together make it difficult for the student to navigate and locate information. Conversely, meaningful grouping and sufficient white space facilitate the reading process.

3.5. Fifth stage – testing and refinement

The designed page is tested with the participation of students, teachers, and, where necessary, special education professionals. Students are asked to explain what an image represents, complete a task independently, and retell key information.

Evaluation takes into account the understanding of the task, the types of errors made, the time required for completion, retention, and the student's perspective. Based on test results, ambiguous symbols, distracting images, and superfluous decorations are revised. This approach allows for the assessment of visual material not merely based on its aesthetic appeal, but on how effectively it serves its educational purpose.

4. An Integrative Model for Designing Visual Codes

Developed based on semiotic and psycholinguistic approaches, this methodological model incorporates the following components:

Stage | Key Task | Expected Outcome | Diagnostic | Defining age, knowledge level, and educational objectives | Establishing requirements appropriate for the student; defining semiotic symbols and their meanings | Developing a coherent visual code; accounting for psycholinguistic factors (attention, comprehension, and memory); creating accessible content; arranging text, images, and tasks | Ensuring a readable layout; testing experimental material with students | Gathering data on practical effectiveness; making corrections to address identified issues; refining the textbook design.

A crucial aspect of this model is that the visual code is not viewed as a static, immutable set of decorations created once and for all; rather, it is treated as a dynamic system that is continuously refined based on pedagogical goals, student needs, and the results of testing.

5. Practical Application and Evaluation of the Methodology's Effectiveness

To apply the methodology in practice, one could, for instance, select the topic "Addition and Subtraction" from a primary school mathematics textbook. While a traditional page might present only mathematical problems, an improved version would integrate illustrations of objects, operational symbols, brief explanations, and independent tasks into a cohesive system.

In this approach, illustrations of objects make numerical quantities concrete, mathematical symbols represent the operations, and the use of color or borders highlights key stages. However, these visuals must not distort the underlying mathematical relationships or distract the student with unnecessary details.

The effectiveness of the methodology can be evaluated based on the following criteria:

Understanding of content: Can the student correctly interpret the relationship between the visuals and the text?



Task completion: Does the visual code make the instructions easier to understand?

Retention of information: Is the student able to recall and explain the core concepts after a period of time?

Independent work: Can the student complete the task without additional assistance from the teacher?

Accessibility and inclusivity: Is the material understandable for students with varying reading levels and different cognitive or perceptual characteristics?

If the effectiveness of a methodology is examined within the framework of scientific research, experimental and control groups can be established, and both initial and final outcomes can be measured. In this process, factors such as the students' age, prior knowledge, reading speed, and the conditions under which instruction takes place are taken into account as much as possible. Only after the results have undergone statistical analysis can a well-founded conclusion be drawn regarding the impact of the methodology.

The quality of the visual code is also closely linked to inclusivity. UNESCO recommendations emphasize the importance of presenting educational information in various formats that are accessible to all, including students with disabilities [5]. Therefore, it is advisable to incorporate features such as image descriptions, text-to-speech (audio reading), sufficient contrast, and simple navigation methods within digital textbooks.

Conclusion.

Integrating semiotic and psycholinguistic approaches enables the design of visual codes for primary school textbooks on a scientific basis. While semiotics helps to define the content and communicative functions of images, colors, symbols, and graphic forms, psycholinguistics helps to account for how these elements are perceived, understood, and retained in memory by the student. The proposed methodology encompasses several stages: pedagogical diagnostics, the development of a system of visual signs, the coordination of text and imagery, the creation of page layouts, and testing and refinement. When these stages are implemented systematically, the visual elements of a textbook transcend a purely decorative role, becoming tools for explaining knowledge and guiding the learning process.

Furthermore, the effectiveness of visual aids is determined not by their quantity, but by their alignment with the content, the clarity of their meaning, and their suitability for the age-related characteristics of the students. Consequently, the design of the visual code for primary school textbooks should be based on the collaboration of educators, linguists, psychologists, designers, and—where necessary—specialists in special education.

Foydalanilgan adabiyotlar

1. Mayer, R. E. *Multimedia Learning*. 3rd ed. Cambridge: Cambridge University Press, 2021.



2. Fiorella, L., Mayer, R. E. *Learning as a Generative Activity: Eight Learning Strategies That Promote Understanding*. Cambridge: Cambridge University Press, 2015.
3. Saussure, F. de. *Course in General Linguistics*. New York: Philosophical Library, 1959.
4. UNESCO. *Guidelines for Accessible Information*. ICT4IAL project resources, 2015. <https://www.unesco.org/en/articles/guidelines-accessible-information-learning-available-23-languages>
5. Guo, D., Wright, K. L., McTigue, E. M. A Content Analysis of Visuals in Elementary School Textbooks. *The Elementary School Journal*, 2019, 119(2). <https://doi.org/10.1086/700266>
6. Tursunova, S., & Chorshanbiyevna, C. S. (2025). OG 'ZAKI NUTQNI RIVOJLANTIRISHDA OTA-ONALAR ROLI. ACUMEN: INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH; Vol. 2 No. 10 (2025): ACUMEN: INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH; 172-176.
7. Tursunova, S. I. (2025). BOSHLANG 'ICH SINF O 'QUVCHILARINI O 'QISH SAVODXONLIGINI SHAKLLANTIRISHDA MATNNING O 'ZIGA XOS XUSUSIYATLARI. ACUMEN: INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH; Vol. 2 No. 3 (2025): ACUMEN: INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH; 109-113.
8. Tursunova, SI, Xolnazarova, FE, & Kabulova, KC (2025). BOSHLANG'ICH SINF O'QUVCHILARINING O'QUVCHILAR FIKRLASHIGA OG'ZAKI ARIFMETIKA MASLAHATILARINING TA'SIRINI TAHLIL QILISH. *Zamonaviy ilmiy tadqiqotlar* , 3 (9), 178-183.
9. Ulashova, N., & Tursunova, S. (2026). BOSHLANG 'ICH TA'LIMDA INKLYUZIV QADRIYATLAR MAZMUNI. JOURNAL OF LANGUAGE AND LINGUISTICS; Vol. 9 No. 2 (2026): JOURNAL OF LANGUAGE AND LINGUISTICS; 135-138.
10. Tursunova, S. (2023). BOSHLANG'ICH MAKTAB O'QUVCHILARINING OG'ZAKI NUTQINI RIVOJLANTIRISH UCHUN DARSLIDAN TASHQARI MASHG'ULOTLAR MODELLARINI TANLASH SABABLARI. *Fan va innovatsiya* , 2 (B11), 262-266.