Submission date: October 2025 **Acceptance date:** November 2025 **Publication date:** December 2025

DEVELOPMENT OF STUDENTS' VISUAL COMMUNICATION SKILLS IN EDUCATION AMID EVOLVING ARTIFICIAL INTELLIGENCE TOOLS

DESARROLLO DE COMPETENCIAS EN COMUNICACIÓN VISUAL DE LOS ESTUDIANTES EN LA EDUCACIÓN FRENTE A HERRAMIENTAS DE INTELIGENCIA ARTIFICIAL

Marina Titova[1*]
E-mail: titovamarina010880@gmail.com
ORCID: https://orcid.org/0009-0007-2389-4325
Serikkhan Zhuzeyev[2]
E-mail: serik_juzeev@mail.ru
ORCID: https://orcid.org/0000-0002-6552-9584
Artemiy Kozachek[3]
E-mail: avkozachek@list.ru
ORCID: https://orcid.org/0009-0004-4453-0377
Ekaterina Andreeva[4]
E-mail: eyandreeva@fa.ru
ORCID: https://orcid.org/0000-0001-9953-4958
Rustem Shichiyakh[5]
E-mail: shichiyax.r@kubsau.ru
ORCID: https://orcid.org/0000-0002-5159-4350
[1] Altai State University, Russia
[2] Korkyt Ata University, Kazakhstan.
[3] Tambov State Technical University, Russia.
[4] Financial University under the Government of the Russian Federation.
[5] Kuban State Agrarian University named after I.T. Trubilin, Russia.
*Corresponding author

Suggested citation (APA, seventh ed.)

Titova, M., Zhuzeyev, S., Kozachek, A., Andreeva, E., & Shichiyakh, R. (2025). Development of students' visual communication skills in education amid evolving artificial intelligence tools.*Revista Conrado, 21*(S1), e5051.

ABSTRACT

This study examines the development of visual communication competencies among university students within an educational environment increasingly influenced by artificial intelligence tools. The purpose of the research was to assess how students select, use, and evaluate visual materials in academic tasks, and to identify gaps that affect the quality and integrity of educational outcomes. The methodology combined theoretical analysis of literature on visual literacy with an anonymous online survey of 175 students, which explored the frequency of visual material use, the sources students rely on, and their understanding of copyright and licensing requirements. The findings indicate that students actively incorporate visual materials into their academic work, frequently using general search engines and AI-generated images. However, many demonstrate limited ability to verify the accuracy, reliability, and legality of visual and audiovisual content. A substantial proportion rarely checks copyright restrictions or cites image sources correctly, revealing notable gaps in visual literacy and information ethics. The study concludes that higher education institutions must strengthen instruction in visual communication competencies, with particular emphasis on critical evaluation, ethical use, and responsible integration of AI-generated content. Such competencies are essential for ensuring academic integrity and preparing students for participation in digitally mediated learning environments.

Keywords:

Visual communication competency, higher education, visual literacy, digital media use, information ethics

RESUMEN

Este estudio examina el desarrollo de las competencias de comunicación visual entre estudiantes universitarios en un entorno educativo cada vez más influenciado por herramientas de inteligencia artificial. El objetivo de la investigación fue evaluar cómo los estudiantes seleccionan, utilizan y evalúan los materiales visuales en sus tareas académicas, e identificar las deficiencias que afectan la calidad e integridad de los resultados educativos.

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La metodología combinó el análisis teórico de la literatura sobre alfabetización visual con una encuesta anónima en línea a 175 estudiantes, la cual exploró la frecuencia de uso de materiales visuales, las fuentes que consultan y su comprensión de los derechos de autor y los requisitos de licencia. Los resultados indican que los estudiantes incorporan activamente materiales visuales en su trabajo académico, utilizando con frecuencia motores de búsqueda generales e imágenes generadas por IA. Sin embargo, muchos demuestran una capacidad limitada para verificar la precisión, la fiabilidad y la legalidad del contenido visual y audiovisual. Una proporción considerable rara vez verifica las restricciones de derechos de autor o cita correctamente las fuentes de las imágenes, lo que revela importantes deficiencias en alfabetización visual y ética de la información. El estudio concluye que las instituciones de educación superior deben fortalecer la enseñanza de las competencias de comunicación visual, con especial énfasis en la evaluación crítica, el uso ético y la integración responsable del contenido generado por IA. Estas competencias son esenciales para garantizar la integridad académica y preparar a los estudiantes para participar en entornos de aprendizaje mediados digitalmente.

Palabras clave:

Competencia en comunicación visual, educación superior, alfabetización visual, uso de medios digitales, ética de la información.

INTRODUCTION

The wide accessibility of audiovisual media (the assortment and relative ease of using graphics and presentation applications) substantially affects opportunities to create educational materials. Teachers begin to use various audiovisual content creation applications in their professional practice when creating online courses, lectures, and seminars, making presentations, editing brochures, and preparing presentations and articles (Chernova et al., 2025).

Given the changes in the way today's youth think, to maintain the effectiveness, intensity, and pace of learning and to actively engage students in all types of educational activities, teachers need to appropriately change their approaches to the selection, adaptation, preparation, and presentation of educational materials (Akhmetshin et al., 2025a). On the one hand, we need to bear in mind the rapid loss of concentration among modern youth and their tendency to ignore visually unappealing or monotonous content. On the other hand, it is crucial to have a positive outlook on and foster young people's fast thinking and reaction, openness to everything new, and flexibility in perceiving different concepts and points of view. A feature of the current academic behavior of students is also their focus on the result, and due to the aforementioned features of thinking, the search for the shortest path to the goal with maximum ingenuity (Abdullayev et al., 2024b).

With the growing dominance of the visual, it seems counterproductive to adhere to academic attitudes where visual means are considered a primitive or less important form of information presentation with little educational significance (films, computer games, presentations, etc.). Regrettably, students are not taught to read visual texts even though they currently dominate culture as the leading form of communication for young people. The value of modern visualizations is that they are supposed to be not an addition to the text but an integral part of it, presenting information in the form of an image.

Research on visual literacy in the educational environment (the International Virtual Learning Academy (IVLA) and the Association of College and Research Libraries (ACRL)) highlights the effectiveness of combining visual, textual, and verbal methods. Domínguez & Bobkina (2021) define visual literacy as a set of abilities that allow a person to effectively evaluate, use, and create images. These abilities provide the learner with tools to understand and contextualize the visual cultural space based on ethical, aesthetic, intellectual, and technical elements involved in the creation and use of visual materials.

Chávez-Cárdenas et al. (2025) provide a comprehensive perspective on how educational web platforms, enhanced by artificial intelligence tools, can transform contemporary learning processes. The authors emphasize that integrating intelligent digital resources allows students to develop cognitive and creative skills in a more personalized manner, facilitating the understanding of complex concepts through interactive and multimedia visualizations. This approach is particularly relevant for the development of visual communication skills, as it promotes digital literacy, the ability to interpret visual information, and the application of innovative strategies in content creation.

Moreover, the authors highlight the importance of teachers adopting the role of mediators and designers of adaptive learning experiences that integrate AI to enhance student creativity and autonomy. In the context of rapidly evolving artificial intelligence tools, the findings of this work offer both a conceptual and practical framework for guiding the teaching of visual communication, linking technology, pedagogy, and the development of key competencies for 21st-century education.

Modern visual literacy is a fundamental element of hybrid models in education. Requirements for the level of visual literacy needed to reflect communication messages have been defined by a set of competencies in the field of Visual Literacy Competency Standards for Higher Education. There is the concept of visual literacy as belonging to a group of visual competencies that can be developed through vision, integrating other sensory experiences. Researchers emphasize that the development of

these competencies is fundamental to learning, since they enable the interpretation of visually perceived real or artificially generated objects, actions, and symbols present in the human environment (Poroshenko et al., 2024; Shteinberg et al., 2022).

Based on the analysis of scientific research, visual communication competency can in turn be interpreted as a combination of the ability to read, interpret, and create visual communication signals (Grushevskaia, 2024), which are closely tied to visual communication as the process of transmitting and receiving information, which is an important part of the learning process; as the combined use of knowledge, skills, and readiness for actions involved in specific situations that require the use of visual images, while attention is focused on such skills as creating, interpreting, identifying, and contextualizing images, and sharing them with others. The main components of visual communication competency, i.e., the perception, interpretation, and production of visual content, relate to complex cognitive processes, particularly thinking, which means the ability of the mind to create a symbolic model of reality (Bozhkova et al., 2024).

In the environment of higher education, visual communication competencies allow (1) determining the type and amount of visual materials required, (2) efficiently performing online searches and obtaining and sharing the necessary images and visual media, (3) interpreting and analyzing the meaning of images and visual materials in historical, cultural, and social contexts, (4) evaluating the images and their sources, (5) using images for effective visualization, (6) designing and creating image meanings, and (7) understanding the ethical, legal, social, and economic issues associated with the process of creating and using images and visual media, in particular concerning the granting and use of copyright in visual materials (Belikova et al., 2024; Pakshin, 2023).

Thus, the purpose of this article was to diagnose the use of visual materials by students in the learning process and to assess the development of visual communication competencies.

MATERIALS AND METHODS

In this study, we attempted to analyze the features and presence of visual communication competencies in the educational practice of students. The study relies on the following general scientific methods:

a) theoretical: an analysis of scientific sources on the research problem to determine the groups and content of visual communication competencies corresponding to the goals and content of higher education,

b) empirical: an anonymous online survey,

c) mathematical methods to analyze the obtained data.

The study was conducted in 2024-2025 on a sample of 175 university students.

The primary research method was a quantitative study using an anonymous online survey (CAWI) with multiple-choice questions regarding:

1. The frequencies and areas of application of visual materials in students' works,

2. The sources of visual materials used in students' works,

3. Whether students check the legality of using specific visual and audiovisual materials in their works,

4. The citation of sources under the images used by students in their works.

Data processing was performed in Microsoft Excel.

RESULTS AND DISCUSSION

Through the analysis of scientific literature, we established the set of visual communication competencies that correspond to the goals and content of higher education (Table 1).

Table 1: Groups of visual communication competencies

No.	Competency group	Content of competencies
1	Identifying the need for images	Sources, research spheres, selection criteria, types and formats, generation of ideas
2	Image search	Identification, search, selection, finding, use
3	Image interpretation and analysis	Text data, contexts, understanding, meaning

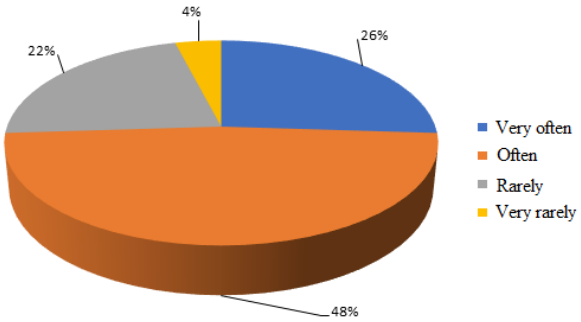
4	Evaluating the utility of images	Aesthetics, transformation, source reliability, effectiveness of use
5	Effective (productive) use of images	Communicative impact, impact on the project, technology use, visual thinking (logic)
6	Creating new images	Choosing the best design, graphic presentations, experimenting, creatively using visual motifs and visual concepts
7	Ethical citation of images and videos	Intellectual property, copyright, censorship, privacy

Source: Authors' own elaboration

It should be emphasized that the basic indicator of visual communication competency is the level of use of various graphic materials.

Answers to the question "How often do you use visualization (figures, diagrams, drawings) in the materials you prepare?" show that respondents often and even very often try to use various types of images in their works (74%) (Figure 1).

Fig. 1: Frequency of use of visual materials in students' works.



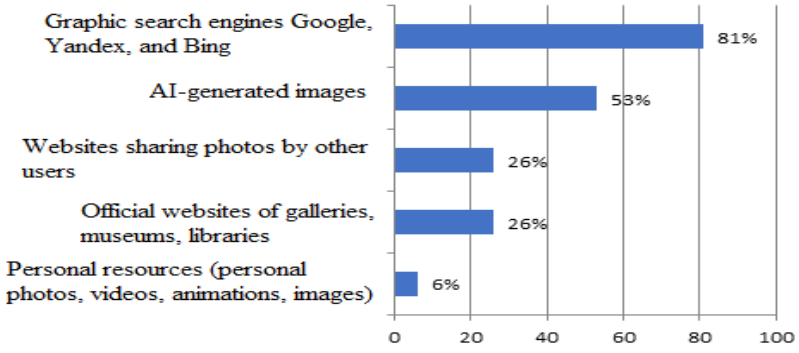
Source: Authors' own elaboration

The question "How do you most often receive visual materials when preparing training?" (multiple choice) revealed that the Google and Yandex search engines are an indispensable source of visual materials for students, used by 81% of respondents. Here, we should note that Google and Yandex resources are fundamental in the image search process, likely due to the prominence of these search engines. Regarding the Bing graphic search engine, we note that in February 2023, Microsoft introduced a new version based on AI. The search engine can process queries up to 1,000 characters and compose text responses to them.

Second place (53% of respondents) is held by generating images with AI.

About a quarter of respondents (26%) get images from the websites of official visual cultural collections (library collections, online galleries, museum websites, and galleries). The same number of respondents (26%) get photos and multimedia materials from photo and video hosting websites. A relatively significant number of students (13%) mentioned their own graphic, photographic, and film resources as the source of the graphic works used. These visual materials are collected by them in albums available online (Figure 2).

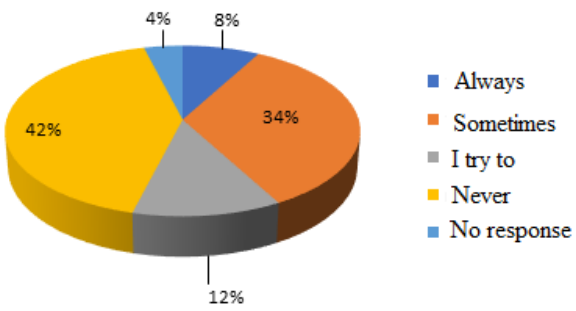
Fig. 2: Sources of visual materials used in students' works.



Source: Authors' own elaboration

To use digital images for educational and personal purposes, one needs to be aware of and check the appropriate licenses. Students should be informed about usage rights for images posted online. Our study showed that the use and processing of graphic materials in violation of copyright and licensing conditions is a frequent occurrence among students. Answering the question "Do you check the legality of using published images and graphics in your work?" about half (42%) of students said they never check the images and photos they use for copyrights and licenses (Figure 3), and 34% do so rarely. Some respondents refused to answer this question, presumably because they were aware of the violations.

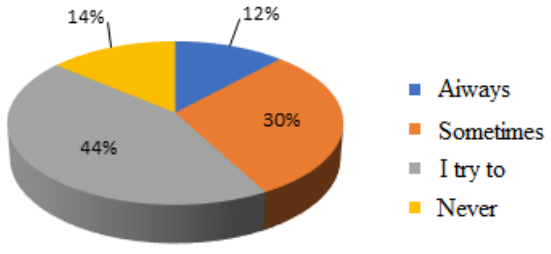
Fig. 3: Checking the legality of using images in students' works.



Source: Authors' own elaboration

When it comes to audiovisual materials, students are more aware of licensing restrictions than when copying images and photographs. In response to the question "Do you check the legality of using audiovisual materials in your work?" approximately 66% of respondents reported using video materials in compliance with the terms of the chosen license. This is likely because information on the requirements and licensing restrictions on the use of audiovisual materials is more readily available (Figure 4).

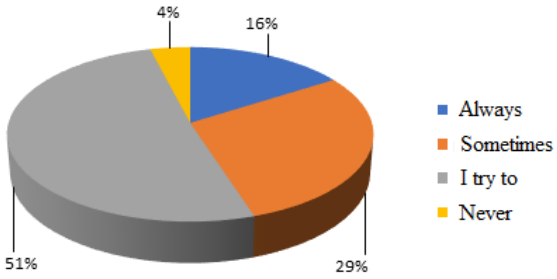
Fig. 4: Checking the legality of using audiovisual materials in students' works.



Source: Authors' own elaboration

Another alarming phenomenon is the attitude of respondents to citing visual materials found online. In their answers to the question "Do you cite the sources of published images and graphics that you used in your work?," only 16% of respondents said they always describe these sources. "Relatively" proper behavior was demonstrated by approximately 51% of respondents, who recognize the need to provide bibliographic information but do not always do so for various reasons. A concerning result is the response rate of the option "never," which outlines a group of people who reject educational standards in the use of visual information. The share of the option "rarely" (29%) indicates low awareness and points to the need for pedagogical intervention (Figure 5).

Fig. 5: Providing bibliographic information under the images used in students' works.



Source: Authors' own elaboration

Discussing the results obtained, we can conclude that visual information is playing an increasingly important role in education — it is growing more popular among both students and teachers, the latter seeing a possibility of simpler, faster communication with their students and more effective presentation of educational content. These conclusions are not novel and are supported by several other works (Abdullayev et al., 2024a; Serebrennikova, 2024).

However, it should be said that university students, having the task of carrying out scientific research or preparing abstracts or reports, give due attention to choosing illustrations for their work, since the visual component can bear the lion's share of the semantic load of the text, highlighting ideas and placing accents. At the same time, the wide access to illustrations, paintings, photos, graphs, infographics, etc., offered by the Internet does not guarantee their competent use. For the most part, students pick materials from the results given by the search engine. This search strategy does not ensure a critical study of the material and, therefore, reduces the academic level of the work. This is one of the most discussed problems in the available literature at the moment (Akhmetshin et al., 2025b; Gazizova et al., 2025). Therefore, based on the results of the study, we are wary of the academic prospects of modern students, who do not have enough knowledge and skills to use visual materials and, in particular, increasingly rely on AI tools without checking the results. This

demonstrates the need for further study of the problems and questions related to visual communication competency, which has already been indicated by studies similar to ours. To process information, especially that obtained through AI, a student must have specific skills to read, analyze, and interpret this information as objectively as possible.

Current education standards require students to produce meaningful academic writing that requires competent use of illustrative material: the ability to select the material, logically arrange it, and align it with the meanings of the initial text.

Grushevskaia (2024) emphasizes another aspect related to visual communication competencies: "Students do not learn to read visual texts, although they currently dominate in culture, being the main form of communication among young people." Therefore, it can be suggested that teachers should fully and consciously build the visual competencies of students, pointing out optimal strategies for reading information or proven, effective schemes for processing information.

As suggested by (Rybakova, 2021; Veliliaeva & Tarkhan, 2021), the most effective development of visual communication competency is preceded by thorough training of the teacher, at the core of which lie four methodological and pedagogical problems.

First, the forms of visualization and the aspects of the discipline to be visualized need to be identified.

Second, the textual or factual information to be used in training needs to be visualized. If, for example, a scheme or photo is borrowed, it is imperative to observe copyright law (Isaakov & Oshmarin, 2024), citing the author and the source of information, and once again underscore the importance of compliance with academic integrity for students. It is also important to be ready for the spontaneous transformation of some aspect or topic into a format convenient for students at their request.

Third, students themselves need to be taught to effectively visualize the material with all current academic and career-specific trends in mind.

Fourth, it is crucial to develop students' skills in using the appropriate vocabulary so that they can freely describe the visualizations provided both verbally and in writing and, consequently, write adequate and concise text messages (legends, accompaniment, or inscriptions) for the visual content that students create based on a text fragment or make on the spot, as repeatedly demonstrated by the teacher.

The use of technological tools, the interpretation of content found online, the critical reception of information, and its creation both in text and visual and audiovisual forms now form the basis for the formation of visual communication competency. Programs that provide information and visual communication competencies should be developed comprehensively and coherently. Particular attention should be paid to information competencies when preparing students for continuous education, which today is a prerequisite for personal development, the improvement of general and professional qualifications, and, as a result, the effective formation of a competitive labor market.

CONCLUSIONS

The visualized learning environment has to perform cognitive, educational, and teaching functions in the process of teaching and learning. It allows the person to learn about the surrounding reality better and develop cognitive abilities and thought processes that improve the understanding and assimilation of the presented knowledge.

Therefore, in the modern world, visual communication competency is a competency that allows the person to read and interpret media reality, giving it original meanings. This competency changes the person's perspective on the world, not only in the professional sphere but also in everyday life, allowing them to consume information in a conscious way and thus contributing to their overall cultural development.

Visual information can only contribute to a better understanding of the educational content and transferred knowledge if properly compiled. Faculty and students alike more often create visual content themselves. In this context, teachers need to be provided with methodological instructions on organizing students' work so that the visual communication competencies they develop are more universal and technically correctly verified. Our further research will focus on the didactics of working with information, i.e., how to build a learning process that enables students to more effectively create information by improving the quality of perception of visual content. This research will help develop training methods, among other things, for the formation and development of visual communication competencies.

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