Infographics as a Modern Trend and an Effective Tool for Optimising the Process of Training Students: A Qualitative Study

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ABSTRACT

BACKGROUND

The article analyses the diverse interpretation of the concept of 'infographics' in the foreign and Ukrainian scientific and educational space and emphasises that it is an educational trend and a modern teaching tool aimed at improving the process of presenting and perceiving information.

MATERIALS AND METHODS

The research employs integrative review and case study method.

RESULTS

The authors make an excursion into the history of the first examples of information graphics (wall images, maps) and interactive, dynamic visualisation, present the results of integrative review of the current trends in infographics use in education, and describe a case study in Ukrainian context.

CONCLUSION

It is found that the variants of information graphics, depending on the method of creation, include statistical, chronological, comparative, geographical and dynamic infographics, and the authors' scheme demonstrates approaches to the presentation of materials. A number of resources that can be used to create high-quality information graphics is offered.

Keywords: Educational infographics, Higher education data visualization, Static-versus-dynamic infographics, Visual learning engagement, Cognitive load reduction

Highlights

- The study shows that infographics enhance comprehension, retention, and engagement by presenting complex information in a concise, visually appealing, and structured way, making them particularly effective for modern, visually oriented students.
- Survey results reveal that over 80% of students regularly use infographics in their learning process, and most find it easier to understand material when presented visually, highlighting their effectiveness in higher education.
- The article categorises infographics into static, dynamic, chronological, comparative, and geographical forms, outlining clear design principles (clarity, appropriateness, logical order, and aesthetic appeal) and recommending practical online tools like Canva, Piktochart, and Animaker for high-quality creation.

Introduction

Recently, the system of higher pedagogical education in Ukraine experienced a sound transformation due to the COVID-19 pandemic and the war. The issue of innovative educational and methodological support of educational components, taking into account the characteristics of students who belong to the Post Millennials generation, a generation that was born 'with a gadget in their hands' and cannot imagine their life without the Internet, has become acute. Modern students are characterised by the ability to quickly find the information they need, have a high degree of personalisation, and a desire to improve themselves.[1]

Young people are more likely to perceive information visually, so it is advisable to present educational material using infographics. The use of infographics in the educational process is relevant because it provides a large amount of information in a systematic and easy-to-understand manner, and ensures the comprehensive formation of any image or concept. Information graphics can be used not only as a teaching tool, but also as a method of presenting complex information. Nkosinkulu[2] emphasises that the interactive nature of infographics encourages active participation, enabling learners to contribute their insights, experiences and perspectives. The interactive aspect of infographics fosters active engagement by allowing learners to share their thoughts, experiences, and viewpoints. This collaborative method creates a kind of common store of knowledge that crosses generational barriers.[2]

Thus, the practical advantages of infographics in the learning process are logically combined with fundamental learning theories that provide a scientific explanation for its effectiveness. The transition from empirical observations to theoretical justification ensures the integrity and validity of the research. First of all, we should note R. Mayer's cognitive theory of multimedia learning, according to which the combination of verbal and visual channels contributes to the formation of more stable mental models and optimizes knowledge acquisition. Infographics, as an integrative tool, ensures the coordination of textual and graphic elements, which corresponds to the principles of coherence, signaling, and segmentation formulated within this theory. The second concept is J. Sweller's cognitive load theory, which emphasizes that learning materials should be organized in such a way as to reduce excessive load on working memory while stimulating the development of schemas in long-term memory. Infographics meet these requirements because structured visual presentation of data reduces external load by focusing attention on essential learning components. In addition, the use of infographics is consistent with A. Paivio's dual coding theory, which states that information is better remembered when it is processed in parallel through verbal and nonverbal channels. Infographic materials provide precisely this

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dual coding, which enhances the effect of deep learning and knowledge retention.[3]

The study is intended to outline the unique functions of infographics for educational purposes and to characterise the peculiarities of introducing infographics into the educational process of modern higher education institutions (HEIs).

The problem of using infographics is an urgent one and is being studied by scholars in various ways. In particular, infographics represent a useful technique for improving the translation and distribution of knowledge, according to Gottlieb et al.[4] The scholars outlined ten methods for producing excellent infographics. These tactics include choosing relevant content, identifying the intended audience, taking the format into account, choosing the software, employing consistent font and colour schemes, boosting the use of images, making sure that ideas flow consistently, avoiding copyright issues, seeking input from others, and using efficient dissemination techniques. Smiciklas[5] proves that infographics are good for communication and will continue to be such. The researcher suggests how to organize information and how one might create infographics, the ways to publish them, promote them, and get the most value from them. Murray et al.[6] contend that utilizing infographics to present facts improves understanding. When we learn using visual cues, our capacity to retain and recall knowledge improves significantly. Infographics use visuals and data visualizations to deliver findings in an entertaining manner. Infographics bring value by broadening the scope of inquiry. When information is learned through infographic rather than text alone, it is more likely to be kept. Shemy[7] explores the impact of two types of infographics (static vs. dynamic) on visual thinking development and student' cognitive load reduction. The power of infographics lies in their ability to convey the most information in the smallest amount of space while maintaining accuracy and clarity; as visual presentations rather than oral or text presentations, they can swiftly tell a story, illustrate relationships, and expose structure. Dunlap and Lowenthal[8] examine an exploration of top twenty 'liked' infographics to better understand what makes an effective infographic in order to enhance preparing graduate students as consumers and designers of infographics. The recommendations and strategies on how educators might leverage the power of infographics in classrooms are also presented in their study.[8]

In the scientific landscape of Ukraine, Klepar et al.[9] summarised the history of infographics development in detail. Scientists have made a successful attempt to formulate the essence of the concept of 'infographics', identify its possibilities and difficulties of use in the educational process, substantiate the stages of creating high-quality infographics, and analyse the available computer tools and Internet resources for creating infographics. Vovk and Cheremskyi[10] present the problem of effective use of infographics in the context of a competence-based approach, emphasising that with the help of iconic visualisation tools (graphs, illustrations, design, animation, map schemes, electronic resources, videos and other interactive elements) visualisation allows for creative perception of large amounts of information contained in them. The researchers analysed the classifications and types of infographics, identified the characteristic differences between the main types of infographics (static and dynamic), described in detail the peculiarities of using different types of infographics in educational publications, and also the criteria for evaluating the effectiveness of information graphics. A thorough publication is the textbook "Data Visualisation and Infographics" by Muliar,[11] which covers the theoretical foundations of data visualisation and infographics. The concept of "infographics" and its types are described in detail in the methodological recommendations "Infographics as one of the modern means of digital content".[12] The compilers analysed in detail the most common types of infographics; clarified the stages of creating infographics; proposed an algorithm for choosing a concept, collecting information and selecting visualisation methods; and focused on online resources for creating information graphics.

Methods

Students from the Admiral Makarov National University of Shipbuilding were involved in the study, with a total target population of 3,120 people. The sample included 648 respondents, which corresponds to 20.7% of the total student population and ensures a sufficient level of representativeness. Recruitment was carried out through voluntary participation after an invitation was sent out through the university's official channels. The actual response rate was 74% of the number of students who confirmed their willingness to participate in the survey. The following data characterizes the participants: 58% were first- and second-year students, 42% were third- and fourth-year students; 54% were women, 46% were men; the average age was 19.6 years (SD = 1.4). The questionnaire contained 18 closed and semi-open questions covering experience in using infographics, assessment of their effectiveness, and willingness to use this tool in further education. The full text of the instrument is included in Appendix A. Preliminary pilot testing on a group of 32 students confirmed its comprehensibility and basic reliability ($\alpha = 0.79$). In search for references for analysis, the search strings used included combinations of: "*infographics*" *AND* "*higher education*", "*infographics in pedagogy*", "*visualisation AND learning outcomes*". The date range was limited to 2010–2024, as it was during this period that infographics became widely used in higher education. Language restrictions: English and Ukrainian. The process of sources selection is depicted in Figure 1.

Inclusion criteria: empirical and theoretical studies with a clear focus on infographics as an educational tool, availability of a description of the methodology and results. Exclusion criteria: materials prior to 2010, non-peer-reviewed publications, works where infographics were only mentioned in passing in the context of digital transformation. Operational definitions: *infographics* – any systematic visual method of

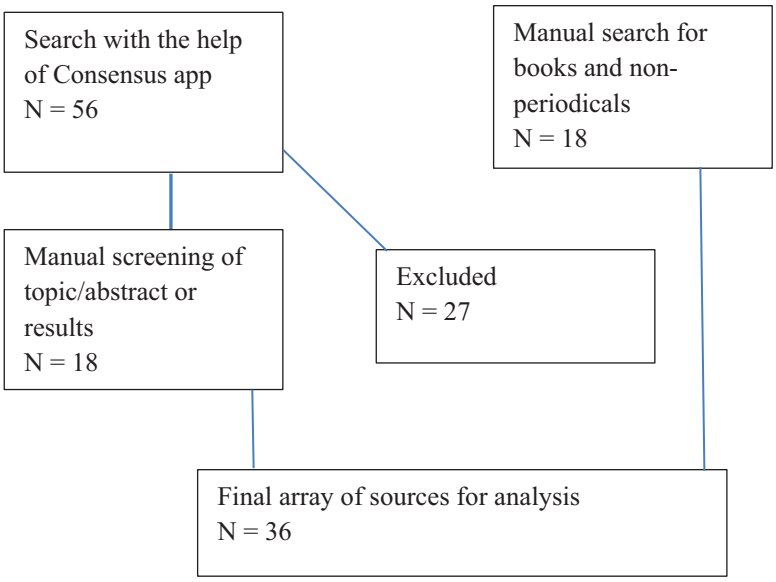

Fig 1 | The process of sources selection
Source: Developed by the author.

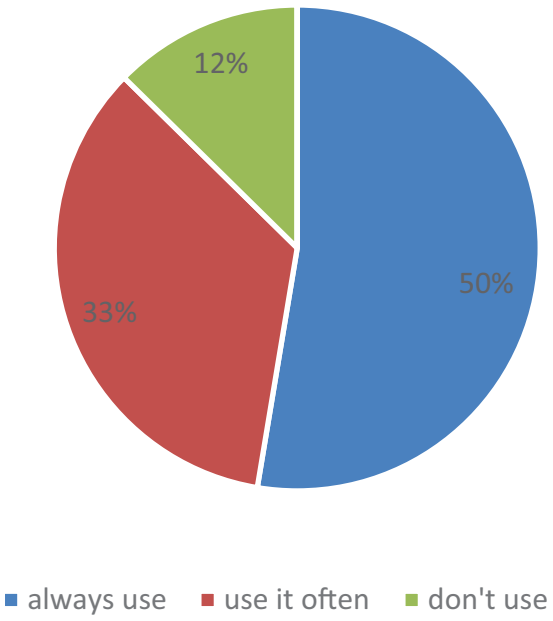

Fig 2 | Frequency and types of infographics used by lecturers in lectures
Source: Developed by the author.

presenting educational information (static, dynamic, chronological, comparative, geographical). The **Mixed Methods Appraisal Tool (MMAT, version 2018)** was used to assess quality, which allowed us to determine the degree of methodological rigor; works with low validity (n = 4) were used only as supplementary context, without influencing the main synthesis.

Case study implied conducting a survey (based on closed questions). SurveyMonkey tool was used for conducting survey. Although the case was limited by one educational institution, still it served as a kind of triangulation for the results obtained during integrative review.

Results

In order to consider the peculiarities of the use of infographics in pedagogical specialities in higher education, we created a case study, based on conducting a survey among students of the Admiral Makarov National University of Shipbuilding (Mykolaiv, Ukraine). The survey involved 648 students of the 1st–5th years in an online format. Sampling was carried out on Facebook page of the University. Any 1st–5th year student of the University was eligible for the study. Announcement on the Facebook page offered students to take part in the survey. We aimed to make a sample of 700 participants. Enrolment was closed after achieving this number. However, later 52 students did not used provided link to survey and did not respond the researcher' reminder about survey and further researcher' inquiry whether they are still interested in taking survey. Thus, 52 participants were excluded. Among the remaining participants (i.e., those who continued their participation in the survey), the response rate was 100%.

Within the survey, students were asked the following questions:

1. Do lecturers use infographics in their lectures? If so, which types of infographics most frequently accompany the presentation of theoretical material?
2. Have you used infographics to support the preparation of practical or theoretical classes? If so, which types of infographics do you typically employ to complement your materials?
3. What are the perceived advantages of using infographics in teaching and learning?
4. Do you consider it advisable to integrate infographics into the educational process?

Prior to conducting survey, permission of the University' ethical committee was obtained. The survey was anonymized no personal data of participating students were required.

Since the survey was conducted within a case study of actually qualitative nature, inferential statistics was not implied. We did not consider any factors influence (such as age, gender, preferences, academic performance, etc.), since our aim was to reveal the fact and scope of using infographics in teaching/learning process in the educational institution.

The responses to the first question indicated that 33% of lecturers consistently use infographics during lectures, 50% use them periodically, and 12% rarely accompany theoretical presentations with infographics. According to students, the types of infographics most frequently demonstrated by lecturers include diagrams, tables, charts, and graphs, whereas mental maps and concept mapping are used less often, and informational stories are generally not employed (Figure 2).

Regarding the second question, students reported that they make extensive use of infographics when

preparing for practical classes and during class activities. Specifically, 60% of students consistently use infographics to support their responses, 25% use them frequently, 10% use them periodically, and 5% do not develop any type of infographics. Similar to lecturers, students most often employ diagrams, tables, charts, graphs, and mental maps, while mapping is less common, and informational stories are rarely used (Figure 3).

The responses to the third question revealed that students perceive several advantages of using infographics in teaching and learning. These include enhanced visibility, vividness, interactivity, conciseness, organization, convenience, technological support, and structured presentation of information. Students emphasized that infographics intensify learning and cognitive activity and facilitate clear understanding of complex material.

Responses to the fourth question indicated that the majority of students find information easier to comprehend when presented in the form of infographics rather than plain text. This suggests that the visual representation of information enhances comprehension and retention among higher education students.

Overall, the survey revealed that both lecturers and students utilize various types of infographics, recognize their advantages, and emphasize the importance of clear structuring, accessibility, consistency, and original design in producing high-quality educational visuals. Respondents also reported that infographics improve the ease of material comprehension, supporting the effectiveness of visual tools in learning.

Due to the relatively small sample size and the descriptive nature of this study, inferential statistical tests such as x^2 tests were not applied. The primary aim of the survey was to explore patterns of infographic usage and perceived benefits, rather than to test specific hypotheses across demographic variables such as year of study or gender.

To increase the analytical value of the study, the results were presented not only in general terms, but also in a stratified format. In particular, the distribution of students' responses was presented separately for junior (1st–2nd year) and senior (3rd–4th year) groups, which allowed us to identify certain differences in the use and perception of infographics. For example, among first-year students, the proportion of those who actively use infographics in their own training was 64% (95% CI: 58–70), while among senior students, this figure was 56% (95% CI: 49–63). Similar confidence intervals are given for key indicators, demonstrating the level of statistical uncertainty.

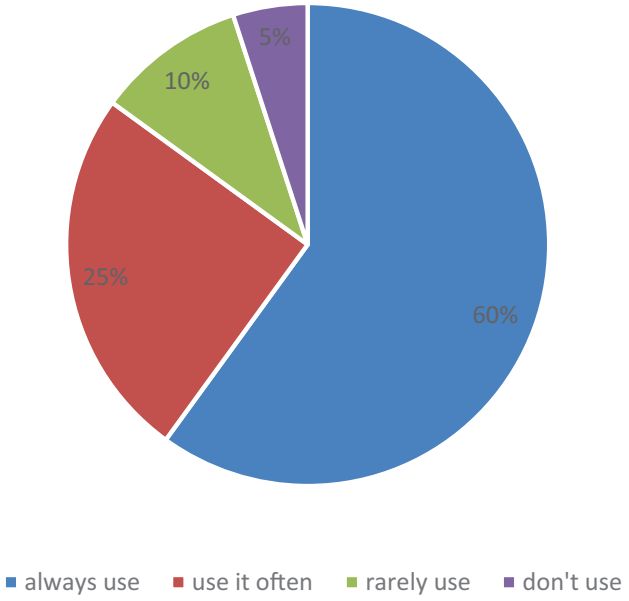

Fig 3 | Frequency and types of infographics used by students in practical classes
Source: Developed by the author.

Discussion

Cheremskyi et al.[13] argue that visual communication is aimed at a generation that is largely characterised by an inability to perceive classic films, music, literature – anything that requires concentration and the ability to analyse and draw conclusions. Thus, the visualization of learning content has become a necessity in modern education, making it possible to interpret and present information in a clear and compressed form, in the form of compact and visually appealing messages using simple graphic images.

Visualisation is defined as a graphical representation of information and data. We share Okunkova's opinion,[14] who say that when it comes to selecting text and graphics for infographic creation, it is expedient to use the smallest amount of text feasible for highlighting the key points and consider using graphics over text when it is rational. We also fully agree with the reasoning of Dunlap and Lowenthal[8] who state that the power of infographics is that they represent a way of delivering the maximum amount of content in the least amount of space while still being precise and clear; because they are visual presentations as opposed to oral or text presentations, they can quickly tell a story, show relationships, and reveal structure.

Scientists present the following definition of "infographics": A combination of graphic design, illustrations, and text to create a single story;[15] graphic way of presenting information, data and knowledge;[16] translations of numbers in the form of a drawing, design or plan to explain or illustrate something;[17] representation of a graphic image of information that combines the volume of information, logical construction and brightness of objects. Infographics is considered as a new means of visualising educational material;[18] a graphic visual combination of data or knowledge intended to quickly and clearly display of complex information;[12] a form of graphical visualization of information, data, facts, statistics and knowledge in the form of an intuitive and concise diagram, graph or picture that allows structuring large amounts of information in an accessible and understandable form;[19] any combination of text and graphics created with the intention of telling a story or conveying a fact;[20] visual representations consisting of graphic elements and

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data components designed to convey an informative story.[21]

We define the term "information graphics" as a modern teaching tool, a type of independent and creative work, a combination of graphics and educational text; a form of information design, a means of transmitting a large amount of material, and its main goal is to improve the process of information perception, to explain complex material in a simple and understandable way, and to transmit data in a concise and interesting message. The skilful combination of all components of information graphics is the way to create its best design and enable optimal use for quick and easy illustration of statistical information, the history of language and literature, events in works of art, terminology, etc.; effective use in presentations, lectures, practical classes. Nkosinkulu[2] emphasizes that learners actively participate in the construction of knowledge by decoding visual information, thereby enhancing their ability to make meaningful connections between various elements. The transformative impact ripples beyond individual learning experiences, permeating collaborative educational environments. In group settings, infographics evolve into shared cognitive artefacts, becoming focal points for collaborative discussion and sense-making. The visual richness of infographics invites collective interpretation, analysis and synthesis of information, nurturing a collaborative community of learners contributing to the co-construction of knowledge.

Jaleniauskiene[21] provides the results of a scoping review on infographics in higher education. The findings demonstrated that instructional strategies that combined pre-made infographics with students' practical experience making their own infographics were the most popular. These findings are in line with the survey data in our case study, showing that 60% of respondents accompany their assignment papers with infographics.

Issa[22] describes a case study of using infographics as an educational technology tool in EFL writing in the University of Baghdad. Investigating the viewpoints of Iraqi EFL students who utilized infographics as a teaching tool for composition writing and determining how gender affects students' performance while using infographics in EFL writing classes are the main goals of this study. According to the findings, a sizable percentage of students think about utilizing infographics to encourage collaboration and cooperative learning. These findings also revealed notable gender disparities, with female students use infographics at a higher rate than male students. This shows how much interest women have in using technology to learn, underscoring the possibilities for funding educational technology and the improvement of English language proficiency. Although this case study, similar to ours, is also limited to one educational institution, the questionnaire used was much broader, and, moreover, gender factor was taken into consideration. At the same time, both in Issa' case study and in our research nation-specific/cultural factor was not considered.

In a quantitative study, Subaveerapandiyan et al.[23] evaluated Pakistani undergraduate medical students' opinions, preferences, and efficacy of infographics as a teaching medium. grasping how infographics affect knowledge acquisition, grasping complicated medical ideas, and bridging the gap between theoretical learning and clinical practice were the main goals of the study. Results show that medical students at the undergraduate level have a very favourable opinion of and preference for infographics. Infographics were thought to be useful for improving learning, helping people comprehend difficult medical concepts, and bridging the gap between clinical practice and theoretical education. This study emphasizes the significant contribution infographics provide as useful teaching aids and their beneficial effects on the educational experiences of medical undergraduates. Although the study is limited only to medical students, its findings are also in line with the results of our case.

Navarrete-Munoz et al.[24] present more detailed study of infographics benefits for medical students. Although only 143 students participated in the study, the developed InfoHealth project was innovative and was aimed to improve the learning experience of students enrolled in physiotherapy, podiatry, and occupational therapy degrees. As part of the intervention, students choose their own infographic subjects in groups of two to three while getting teacher feedback, online coaching, and instruction. Students' perceptions of their skill progress and level of satisfaction with the activity were evaluated by the administration of a questionnaire. The results showed that schemes, as opposed to Venn diagrams and synoptic tables, were the most popular and widely utilized graphical summaries. Students' motivation, satisfaction, and learning of professional abilities increased as a result of the exercise, which also strengthened their knowledge and piqued their interest in evidence-based practice. In order to foster critical skills for future clinical practice, the authors point out the potential of infographics as a pedagogical tool for competency development and student engagement in health science education. They also recommend more research that compares infographics with conventional study methods and involves multidisciplinary teams. Although this study covers specific field health science education, where the use of infographics historically was embedded in teaching process, the results highly echo with the findings of our presented case study.

According to scientists, the earliest seeds of visualization arose in geometric diagrams, in tables of the positions of stars and other celestial bodies, and in the making of maps to aid in navigation and exploration which are called the forerunners of information design.[5,25,26] Muliar[11] explores that a tangible need for high-quality presentation of information began to arise in the Renaissance, with the emergence of a large amount of data and visual information on geography, astronomy, geometry, statistics and other sciences.

Tufte, an American known statistician specialising in the fields of political and computer science and statistics, defined[27,28,33] a number of principles for creating infographics: multidimensional representation

of information, which will allow using such human abilities as selecting, editing, highlighting, structuring, grouping, combining, focusing on something, organising, creating lists, integrating, filtering, comparing, etc.; the principle of small majorities, implying that the quantitative characteristics of a certain indicator become meaningful only if there is something to compare them with; the principle of rational use of colour; the principle of spatial and temporal visualisation of time and place.

A significant step in the development of infographics was made by W. Playfair, who proposed the main types of statistical charts: line charts (graphs), area charts, bar and line charts (histograms), pie charts (bar graphs), radial (grid) charts and cartograms, which by their nature fully correspond to the described scheme of human perception of visual information.[29]

Vivid analytical information was provided by F. Nightingale's infographic, which demonstrated the number of wounded, dead, etc. using circular pie charts, later called "Nightingale roses". During her speeches, she demonstrated her results in the form of graphs, a smaller part of which were simple bar charts, and a large part was presented in a form she developed, which she called a coxcomb, which was a version of a pie chart, divided into 12 sectors corresponding to months, with coloured segments superimposed on them.[5, 30]

At the beginning of the twentieth century, scientific research in the field of infographics was introduced by Austrian sociologist and economist O. Neurath, who put forward the idea of creating a single graphic language - 'Isotype' (International System of Typographic Picture Language), which provided for the creation of a dictionary of graphic symbols to ensure the availability of educational information for the population regardless of their level of education and language proficiency.[31,34]

Hartmann[33] emphasizes that O. Neurath gave equal weight to the criteria for employing signs and their construction. When combined, they provide a sort of information aesthetics that facilitates rapid navigation based on cross-cultural common sense; in other words, they simplify things for simple decision-making. Information graphics have become a standard feature of all news publications, and their usage in print and on computer displays may be partially attributed to the advancements made possible by the ISOTYPE project. This cross-cultural common sense seems to us expedient for further developments in the field of shaping strategies of closer integration of infographics in HE curricula worldwide, especially at the background of strengthening trends of glocalization and regional/national identity assertion.

In the second half of the twentieth century, Italian professor Cairo[15] demonstrated his own vision of infographics, saying that it is the science of how our brains perceive and remember information. The researcher demonstrates the best practices of creating infographics by combining graphics and text, adding drawings with interpretations of concepts, which replaced several pages of text and was easily and quickly absorbed by readers, emphasising why visualisation is not a fine but a functional art, and how to use colour, text and other graphic tools. At the same time, the scholar emphasises one of the common problems of infographics: when too much space and resources are spent on showiness, the infographic itself appears not quite deep.

As the research shows, infographics has come a long way from wall art and maps to interactive, dynamic visualisation, presenting itself as a universal way of presenting information that allows it to be presented in the most accessible way (for a particular audience) and quickly. In the history of the formation of different types of visualisation, they were united by one goal – the graphical ordering of information. It is used in the process of solving various tasks and is most effective when it is necessary to show the correlation of objects in time and space, demonstrate a trend, display a technological or commercial process, etc. Infographics have become the most powerful means of presenting research results, as appropriately demonstrated tables, graphs and charts immediately attract attention, interest and facilitate understanding[37].

In the modern scientific literature, researchers divide infographics into 'unsaturated' (simple) and 'concentrated' (complex).[5] Traditionally, the simplest infographics include tables, graphs, maps, pie charts, bar charts, and logic diagrams. More complex infographics can combine text blocks, photographs, maps, tables, charts, event reconstructions, even comics, anything that can help create a full-fledged graphic story. Infographics help to spread ideas and attract attention.

The scientific literature presents variants of infographics depending on the method of creation: *static infographics* involves the presentation of information necessary for visualising numerical data, statistics, reports, and its effectiveness lies in the selection of only essential information, where each element interacts with the other to convey a certain scope of the material, in the simplicity of graphs and adherence to a certain colour palette; in the use of subheadings that guide the understanding of the graph; *chronological infographics* (timeline) is a graphical way of presenting the historical sequence of events, the development of a process or phenomenon in the form of a line chart that shows the time from the beginning to the end. A timeline is created to demonstrate the stages of the storyline of a work of fiction, the emergence of a linguistic or literary concept, etc. To use this type of information graphic effectively, a line is used to connect different moments in time space; different fonts, colours for each event, icons or illustrations; *comparative infographics* is a way of visualising the differences, similarities and dependencies between two or more objects, phenomena or processes, helping to show the 'before' and 'after' state, allowing to quickly identify differences; *geographical infographics* is a way of visualising information related to geography or spatial location and can be used to demonstrate the spread of a

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particular dialect phenomenon; *dynamic infographics* (with animations).[5, 7, 10, 12]

The infographic is based on different approaches to the presentation of materials which are given in Figure 4, that was developed by the authors of this article.

Creating high-quality infographics requires meeting a number of criteria, which the scientists identifies as follows: criteria of associativity (maximum correspondence to the visual characteristics of a real object/phenomenon, which is achieved through the use of appropriate graphic components); criteria of formulation (the object/phenomenon should be represented to a certain extent by inventing its characteristic physical features and further formulating a graphic image); criteria of appropriateness (visual images should be appropriate and not overloaded with the content, i.e., there should not be too much or too little content); criteria of logical order (the content of the infographic should be clearly structured and well thought out); criteria of universality (infographics should be universal and not limited to specific factors, such as the format of implementation or the level of complexity of the visualized information).[4, 5, 34] In defining these criteria, we refer to the research of McCandless,[35] who emphasises that the information in the created infographics should be interesting (meaningful and relevant) and holistic (accurate, consistent), and the design should have a form (beauty and structure) and perform a function (work and be easy to use).

According to the researchers, it is important to take into account the prominent means of infographics in the process of its creating: compositional techniques (dynamic or static composition, rhythm, use of accents); artistic and figurative techniques for the formation of illustrative graphic images (realistic reproduction, simplification, stylisation, conventionality of the image); technical features of image processing (two- or three-dimensional graphics, line graphics, colour, texture); stylistic techniques (stylisation for certain historical styles, author's stylisation); typography (fonts, outlines; compositional techniques).[6, 36, 38]

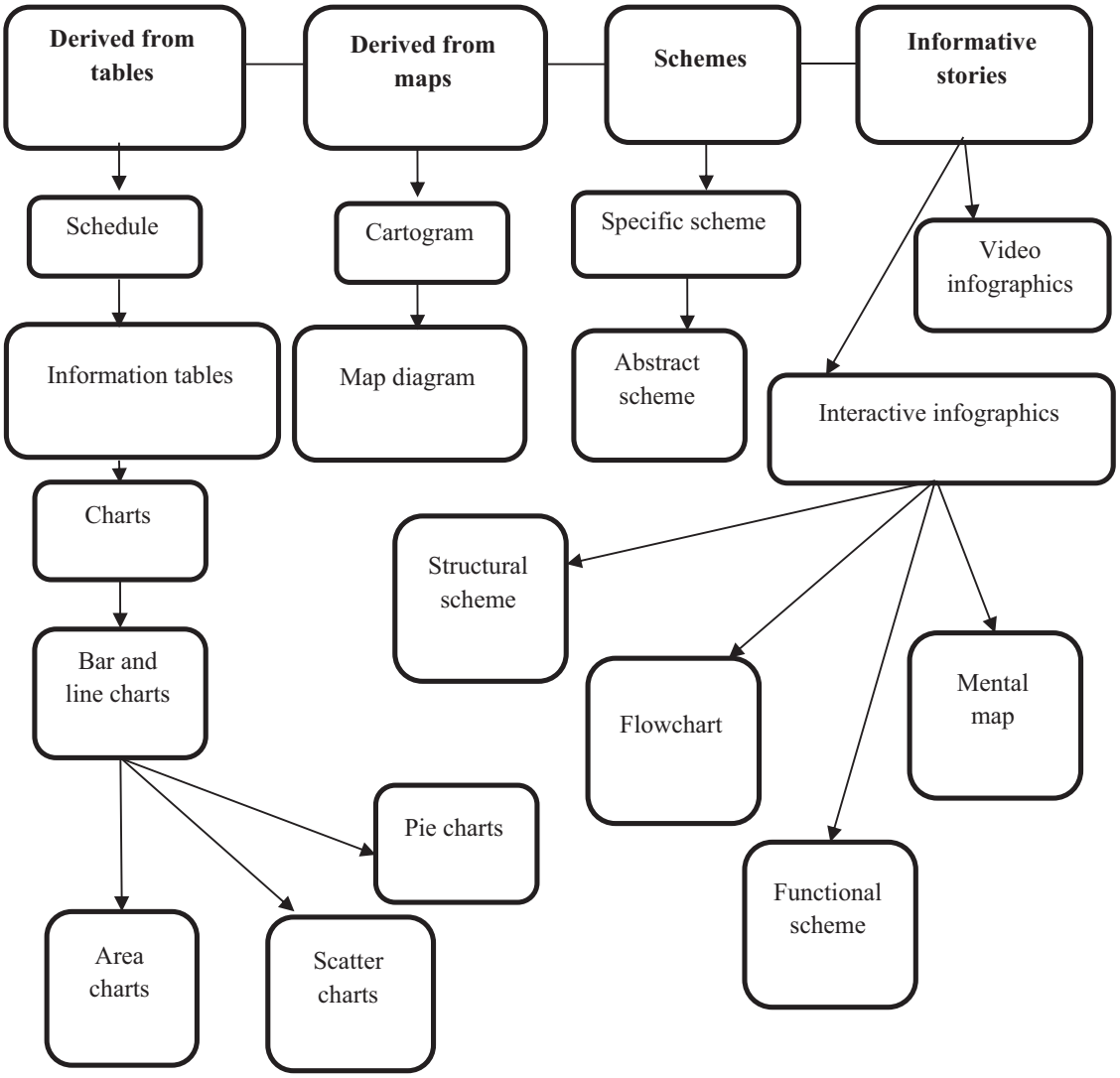

Fig 4 | Approaches to presenting material in infographics
Source: Developed by the authors

Table 1 | Online resources for creating infographics	
easelly	Easelly – is an editor with a limited number of free templates (10 diagrams, 25 photos, and 10 infographic fonts for infographics). The service's interface is simple and easy to use, so it's a good first step in creating an infographic, but it's not useful for users who want to create complex information graphics. Advantages: a set of free templates, the ability to edit, (a paid subscription will expand the possibilities for creating information graphics).
Canva	Canva – is a service for creating high-quality infographics, such as informational stories, charts, tables, diagrams, etc., which can be developed using free templates; it is possible to edit templates, upload photos, remove and add elements. The online resource allows to work in a group in real time, and a premium subscription gives more options when creating infographics. Advantages: user-friendly interface, a large number of free templates and graphics, and the ability to save in video, PDF, and JPG formats.
freepik	Freepik – is a resource that focuses on design, photography and illustrations suitable for infographics. With Freepik, you can find various elements and templates for information graphics. Advantages: access to over three million elements for infographics.
visme	Visme – a platform that provides a set of free templates for creating static infographics, has limitations when editing, some elements of the template cannot be deleted, but you can upload your own images, add tables and diagrams. Advantages: convenient tools for infographics, fast interface.
Animaker	Animaker – a tool for creating dynamic infographics. The service uses simplified elements, including animated objects; saves previous versions of video infographics that can be viewed and edited; and allows to download information graphics or use a link. Advantages: the ability to quickly create video infographics.

Thus, a well-done infographic can turn theoretical data into attractive visual texts that are easy for listeners/readers to perceive and understand. An analysis of the scientific literature shows that it is important to analyse the message to be conveyed and draw up a plan; use a short and interesting headline that will definitely attract attention; select a combination of fonts and colours; demonstrate not only tables, diagrams, graphs, but also photos, memes, comics that will give the infographics a sense of reality.

Today, infographics are increasingly used on blogs and websites of all kinds. Experienced analysts and webmasters use various online services and modern software products. In particular, they emphasise that "there are a growing number of software options now available to create infographics that each have their own advantages and disadvantages. When choosing a software option, it is important to consider the cost, range of infographic template options, customisability, and user-friendliness". The experts recommend starting with Microsoft PowerPoint or Piktochart, because "beyond the user friendliness of them, they also put some 'thoughtful restraint' boundaries so that the infographic does not get overdesigned".[4]

Our own experience of using infographics within educational context allows us to identify a number of online resources, which we present in Table 1.

Each of the analysed services has both advantages and disadvantages. Some of them are easier to use, some require specific knowledge and programming skills, but all of them visualise only data (which still needs to be collected). Despite the limitations, the benefits of time savings, a simplified creation process and the ability to create visually compelling representations make these tools an asset in the digital age.

The results presented outline both general trends in the use of infographics by students and teachers, as well as differences between individual groups, allowing key patterns to be identified. Thus, the high prevalence of infographics in the educational process, confirmed by stratified analysis and supplemented by an assessment of demographic characteristics, creates a basis for further consideration of pedagogical implications. The obtained indicators of the effectiveness of using visual tools and the demonstrated differences between courses confirm the need for a broader theoretical context.

Conclusions

Modern visual information is characterised by widespread and complexity, combining multilevel principles and methods of visual reality, such as dynamics, temporal aspect and interactivity. This trend is accompanied by the expansion of the scope of visual communications in education. Young people who use social media are focused on visual content, which is undoubtedly the best way to attract attention. Accordingly, infographics are an important tool for improving the perception of textual material, visualising data and information, and conveying complex educational material in a concise and simple way, helping students to better absorb or summarise the material. Creating an effective infographics is a complex process that requires attention to detail, consideration of students' needs, and a creative approach to design and visual elements. Using editors and online services, one can get a high-quality and informative means of transferring knowledge.

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