

UDC 37.02:004
DOI: 10.52534/msu-pp1.2025.09

Olena Kosovets*

Phd in Pedagogical Sciences, Associate Professor
Vinnytsia Mykhailo Kotsiubynskyi State Pedagogical University
21000, 32 Ostrozkiy Str., Vinnytsia, Ukraine
<https://orcid.org/0000-0001-8577-3042>

Analysis of educational materials on web technologies for secondary school pupils

Article's History:

Received: 21.10.2024
Revised: 28.02.2025
Accepted: 26.03.2025

Suggested Citation:

Kosovets, O. (2025). Analysis of educational materials on web technologies for secondary school pupils. *Scientific Bulletin of Mukachevo State University. Series "Pedagogy and Psychology"*, 11(1), 9-18. doi: 10.52534/msu-pp1.2025.09.

Abstract. In the modern information society, websites serve as a powerful tool for education, communication, and user interaction. The inclusion of web technologies in the school informatics curriculum is a relevant aspect of developing digital competence, as it prepares young people for life in a digital world and contributes to national economic growth. This study aimed to analyse informatics textbooks and identify key trends in the methodology of teaching web technologies to secondary school pupils. To achieve this objective, a set of theoretical methods was employed, including analysis, systematisation, and synthesis of scientific, methodological, and educational literature, as well as the study of teaching methods and the application of modern digital tools in the process of learning web technologies. The analysis of educational materials on "Creating and Publishing Web Resources" in 8th-grade computer science textbooks showed that the educational content is adequate and up-to-date for building foundational knowledge in this area. It was found that the competencies and practical skills acquired by pupils enable them to realise their potential in developing web pages and websites – ranging from basic projects created using the HTML markup language to complex websites with integrated elements, developed through automated website builders employing current technologies. Significant emphasis was placed on practical tasks, which reinforced theoretical knowledge and fostered essential digital skills in web page creation. The authors actively incorporated modern technologies such as QR codes, online services, and interactive resources, enhancing pupils' motivation and interest in the subject. The findings of this study may be applied in the educational process both in comprehensive schools and specialised institutions to prepare pupils for working with web technologies

Keywords: computer science teaching methodology; computer science textbook; functions of an educational textbook; digital technologies; learning process

*Corresponding author

INTRODUCTION

The evolution of digital technologies is driving a constant transformation of the labour market. Among the new professions that have emerged as a result, those related to the creation and development of websites and web applications stand out. Web developers, front-end developers, and similar roles have been among the most in-demand and highly paid in the IT market for several years. Web technologies are rapidly advancing, and

developed websites offer extensive learning opportunities, and user-friendly interfaces for both professional use and everyday life. Consequently, the ability to develop engaging, functional, and user-friendly websites has become an integral part of the professional competence of information technology specialists. The effective implementation of web projects in the global digital space is a key factor in a successful professional career.



In computer science lessons, pupils can explore roles such as graphic designer, web developer, programmer, and more. Pupils begin learning the fundamentals of web technologies in the 8th grade of secondary school, with the “Creating and Publishing Web Resources” section, and continue their education in upper secondary school through the elective module “Web Technologies”. The computer science textbook is a crucial tool in teaching web technologies to pupils in general secondary education institutions. It provides quick access to theoretical educational material, fosters the development of practical skills, implements the teaching methodology, motivates pupils, and guides them towards future professional pursuits.

K.O. Buts & A.S. Popovkina (2022) investigated the representation of gender stereotypes in contemporary computer science textbooks. The authors proposed an evaluation methodology based on analysing the quantitative ratio of male and female images, gender-sensitive illustrations and texts, their role stereotyping, and the use of gender-neutral language. Research on textbooks from various publication years revealed a positive trend towards reducing gender stereotypes, and expanding the range of professional roles for women, although traditional perceptions of their activities in different spheres of life still persist.

Researchers K.S. Reshevska *et al.* (2024) conducted a comprehensive comparative analysis of computer science textbooks for 10th-11th grade pupils in general secondary education institutions in Ukraine. The purpose of the study was to evaluate the content, methodological approaches, structure, accessibility, and compliance with current educational programme requirements. Particular attention was paid to developing recommendations for the optimal use of textbooks in various educational contexts. The analysis of the textbooks identified certain features of each, namely: the textbooks include self-assessment questions and algorithmic exercises that promote the development of critical thinking; they contain a significant number of practical assignments using modern software; and the educational materials focus on the analysis and creation of information products, which develop pupils' analytical skills and digital competencies. The authors concluded that teachers (in collaboration with pupils, parents, and other educators) should choose the textbook that best suits the teacher's methodological approach and best meets the needs of the pupils in a specific class.

The study of O.M. Yatsko (2023) and O.P. Kosovets *et al.* (2024a) explored the methodological system of teaching computer science, specifically the elective module “Web Design”, as a component of the “Computer Science” subject in 10th-11th grades. The methodological system of teaching computer science was considered as a subsystem, the functioning of which is determined by several factors, including the social demands of modern information society, pupils' computer science competencies, and the goals, principles, and content of education. The article provides a comparative analysis of computer science curricula and textbooks for 10th-11th grade pupils in

general secondary education institutions at both advanced and standard levels, and identifies the specific features of teaching the elective module “Web Technologies”. The conducted analysis of teaching methodology allows for the identification of key aspects of lesson planning, such as time allocation, lesson structure, and the development of practical tasks. O.M. Yatsko (2023) emphasised the crucial role of creating and developing a methodological system for teaching computer science in the establishment of the school computer science course. In this regard, it was relevant to analyse the elements of the methodological system and identify problematic areas that need to be addressed for its further development. O.P. Kosovets *et al.* (2024b) noted that the study of web technologies in schools not only provides pupils with basic knowledge of creating websites and web applications but also fosters the development of critical thinking, creative approaches, and technical skills necessary in today's digital world.

Researchers A. Kholmatov (2023) and A.E. Minarno *et al.* (2021) emphasised the importance of pupils acquiring knowledge and skills in web programming in the context of the rapid development of web technologies. Their studies include an overview of pedagogical technologies and innovative approaches that teachers can use to effectively teach web programming to pupils. Traditional teaching methods often fail to keep pace with the dynamic changes in web development. In this regard, researchers are exploring the integration of modern pedagogical technologies aimed at improving the learning process. Web technology education involves not only learning programming languages, frameworks, and tools but also developing the ability to navigate a dynamic and competitive industry.

Y.-T. Kuo & Y.-C. Kuo (2023) investigated the learning success of African American pupils in a web design course, as well as their attitudes towards programming. In a 14-week web design course, African American pupils learned HTML, CSS, and JavaScript. The study, conducted using a pretest–posttest design on a single group of African American pupils, examined the impact of the course on their academic self-efficacy, web programming self-efficacy, and attitudes towards programming in general. The results showed a significant increase in academic self-efficacy and web programming self-efficacy after completing the course. Most pupils also began to perceive programming positively.

This article aimed to analyse educational textbooks and investigate the methodological features of teaching web technologies to secondary school pupils. The research employed theoretical methods such as analysis, systematisation, and generalisation of scientific, methodological, and educational literature on the studied issues and an analysis of the use of modern digital tools in the methodology of teaching web technologies to secondary school pupils. An analysis of computer science textbooks by authors Y.Y. Ryvkind *et al.* (2021) and N.V. Morze & O.V. Barna (2021) on the topic “Creating and Publishing Web Resources” was conducted.

THE CONCEPT OF "WEB TECHNOLOGIES" IN THE SCHOOL COMPUTER SCIENCE CURRICULUM

The educational topic chosen for analysis is closely related to a modern area of personal and professional development for pupils. The rapid development of web technologies indicates that contemporary website developers are gaining increasingly new opportunities for implementing various projects through the adoption of modern technologies, leading to the full integration of individuals into the modern world of technology and professional development. Therefore, the concepts of web technologies, web design, websites, and web development are fundamental components of a web developer's knowledge. These knowledge bases will determine how web developer can realise their projects related to the creation of websites and web applications.

The term "web technologies" is used to denote a range of internet technologies and online services within the network. Researcher H. Tkachuk (2011) states that "web technologies are information technologies whose use enables the processing of web resources located in the web space of computer networks (local or global)". Authors O.V. Korshunova *et al.* (2021) believe that "the web is not just an environment for storing web pages, but also the foundation upon which internet services exist". Academician V.Y. Bykov *et al.* (2019) considered web technologies as network-based information and communication technologies that support electronic communications in local networks. Web technologies are a fundamental component of the Internet, containing a system for accessing interconnected documents on various computer devices connected to the Internet.

O.V. Korshunova *et al.* (2021) in their 8th-grade computer science textbook note that the Hypertext Markup Language (HTML) serves to structure the content of web pages, defining the layout and visual presentation of user interface elements. A browser interprets HTML code and displays the web page in a user-friendly format. According to N.V. Morze & O.V. Barna (2021), a website represents a virtual space in the global network. Web design is a comprehensive process of creating and maintaining websites, which includes the development of the web interface's structure, design, and functionality. Using HTML, users structure the content of web pages, format text, create hyperlinks, and integrate multimedia elements.

Thus, web technologies are a means of computers and various devices communicating with each other through the use of markup languages. This is network communication created and managed with web content using Hypertext Markup Language (HTML) and dynamic and interactive objects implemented with web programming languages. Web development is the process of constructing interactive web applications and websites, characterised by a high level of dynamism and providing a broad range of functional capabilities. Examples of such developments include social networks, e-commerce platforms like Amazon, corporate portals, and blogs.

THE ROLE OF TEXTBOOKS IN MODERN EDUCATION

The quality of teaching and the organisation of the educational process depend on many factors, one of which is the educational textbook. According to N.Y. Moyseyuk (2007), a textbook is a multifunctional educational book that is a key element of the learning process. An educational textbook contains structured and systematised material, supplemented by various didactic elements, which not only convey knowledge but also guide the learning process. Through various elements (text, illustrations, tasks), the textbook develops specific cognitive skills in pupils, engages them in the learning process, and stimulates cognitive activity. It acts as a kind of lesson plan, where learning objectives, content, and methods of knowledge assessment are clearly defined.

Authors J.R. Rodriguez & M.A. Moreira (2017) analysed how digital technologies are changing school textbooks in Latin America and Europe. In modern digital world, education also actively utilises digital tools: online platforms, websites, and more. Their research focuses on the creation and distribution of digital learning materials at various levels (international, national, regional), as well as their technological and pedagogical features. A.K. Mohar's (2019) research analysed Slovenian textbooks from different periods. The author emphasises that the successful use of electronic textbooks in the educational process requires an understanding of their specific characteristics and requirements from all members of the educational community. He notes that effective use of electronic textbooks requires knowledge of their structure, functionality, and the requirements of the learning environment.

In the research of N. Rodríguez-Regueira & J. Rodríguez-Rodríguez (2022), an analysis of 30 digital textbooks used in Spanish primary schools was conducted. One of the key contributions of this study is the development of a specialised guide for evaluating digital learning materials. This guide enables a comprehensive assessment of such materials, considering their technological characteristics, pedagogical capabilities, and functional purpose in the context of the constant evolution of the digital educational environment. It allows for the consideration of dynamic changes in the digital educational resources market and ensures a more objective assessment of the quality of such materials. This research is a new step in the study of digital learning materials, as the market for such materials is constantly changing.

In the article by O. Kosovets *et al.* (2024b), it is stated that during the educational process, the textbook fulfils the following functions: informational (scientific presentation of subject information, modern data processing methods, creation of reference materials), developmental (development of professional thinking, language, independence, construction of parts of scientific theory), formative (a large number of tasks, including applied ones, demonstration of the real effect of applying scientific methods to them), managerial (preference for active learning methods, increased speed of access to educational and scientific

information), and the application of digital technologies (modern tools, visualisation, infographics, interactive elements). The digital transformation of education has led to radical changes in the role of the textbook. Modern digital textbooks offer new opportunities for interactive learning and personalisation of the educational process. However, the effective use of digital textbooks requires not only modern technologies but also well-designed educational materials and professional teacher training.

PRESENTATION OF EDUCATIONAL MATERIAL IN THE “CREATING AND PUBLISHING WEB RESOURCES” SECTION

Consider applying the aforementioned functions of the textbook to the analysis of the “Creating and Publishing Web Resources” section of computer science textbooks. The chosen textbook section is a new topic for 8th-grade pupils, including in the subject content line of information technologies for creating and processing information objects (Zhaldak *et al.*, 2017; Semenovska *et al.*, 2023). The study of web technology fundamentals involves the development of practical skills in creating websites using popular site builders such as Google Sites, Wix, Weebly, and Strikingly. Pupils are introduced to the basic principles of ergonomically placing information on a web page, learning to create links, and positioning graphical and multimedia elements on website pages. According to the computer science curriculum for general secondary education institutions, 8th-grade pupils should master the following content in the “Creating and Publishing Web Resources” section (Zhaldak *et al.*, 2017):

- automated tools for creating and publishing web resources;
- the concept of Hypertext Markup Language;
- principles of ergonomically placing information on a web page.

The expected outcomes of the cognitive learning activities of 8th-grade pupils indicate that the pupil should master the following components:

- knowledge-based: provide examples of automated tools for creating web pages; understand the concept of Hypertext Markup Language;
- activity-based: create web pages using automated tools and publish them on the internet; use hypertext, graphical, and multimedia elements on web pages;
- value-based: recognise the importance of participating in the global internet community; adhere to the principles of ergonomically placing materials on a web page.

The components of the expected outcomes of cognitive learning activities correspond to the six levels of Bloom's taxonomy. For example, the knowledge-based component covers the lower levels of knowledge acquisition and information comprehension, the activity-based component corresponds to pupils' abilities to use and analyse information, and the value-based component represents the levels of evaluation and synthesis. The analysis of educational textbooks was conducted following the research of

O. Kosovets *et al.* (2024a) to ensure they fulfil the functions of a textbook and achieve the expected outcomes of pupils' cognitive learning activities during the study of this section.

Authors Y.Y. Ryvkind *et al.* (2021) proposed studying the “Creating and Publishing Web Resources” section of the textbook with the following topics: 1) the structure of web pages and the concept of HTML; 2) automated tools for creating and publishing web resources; and a practical task of creating websites using online site construction systems. Pupils learn about: the Hypertext Markup Language (HTML); the use of hypertext, graphical, and multimedia elements on web pages; the principles of ergonomically placing objects on a web page; the stages of creating a website using online site construction systems; methods for creating web pages and placing objects of various types on them; and website publication.

The textbook, within its informational component, provides definitions for concepts such as content, navigation elements, design, ergonomics, Hypertext Markup Language, tags, ergonomic website, site map, and hierarchy. Pupils are given a clear list of recommendations for developing the structure of web pages and are provided with rules for the ergonomic placement of objects on pages. In the section “Concept of HTML”, pupils are introduced to basic tags and their attributes for marking up and formatting text, inserting images into a web page, and creating hyperlinks. The “Key Points” section concentrates on the main ideas of the topic, allowing pupils to recall and quickly review the educational material.

The “Answer the Questions” section contains questions at the basic, intermediate, and advanced levels of learning achievement. The list of questions will help the computer science teacher to ascertain the expected outcomes of activity in the knowledge-based component (whether pupils name components on a web page; understand what constitutes an ergonomic website; know tags and their attributes; understand how to create conveniences for users with special needs on a website), in the activity-based component (whether pupils adhere to the rules of ergonomic placement of materials on a web page; create web pages with images and links using markup language), and in the value-based component (whether pupils analyse each group of web pages; analyse the page source; independently create web pages). The use of high-level questions in lessons – for analysis, synthesis, and evaluation – will enable the computer science teacher to effectively develop pupils' critical thinking skills. The textbook includes a training practical exercise, which can be accessed via interactive elements (Fig. 1), serving as evidence of data processing using modern methods. The authors have included two ways to access the exercise: a QR code or a hyperlink, allowing pupils to access it from either the printed or electronic version of the textbook.

The proposed practical exercise aims to teach pupils to analyse a prepared web page based on its appearance, fulfilling the knowledge-based component of the expected outcomes of cognitive learning activities: identifying page

navigation elements, headings, main content, text formatting, active text or image links, etc. In the practical exercise, pupils examine the HTML code of the provided page and

understand (value-based component) the transformation of the HTML markup code into a web page with text, images, and links (Fig. 2).

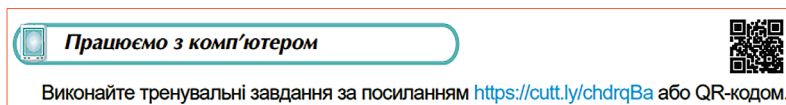


Figure 1. Section “Working with the Computer”

Source: excerpt from the textbook by Y.Y. Ryvkind *et al.* (2021)

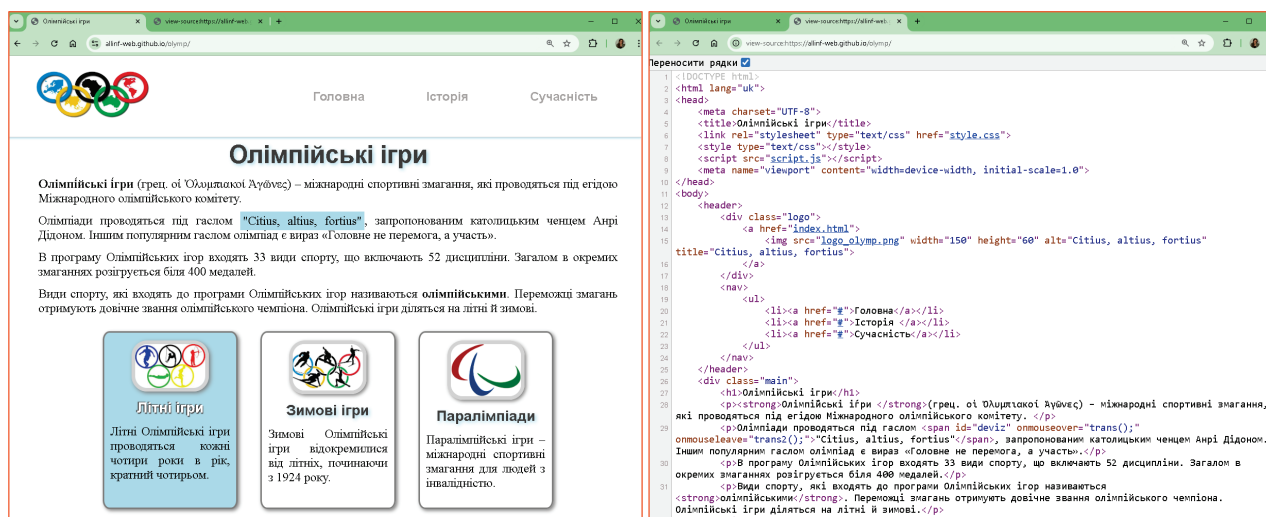


Figure 2. Training practical exercise

Source: a fragment of the textbook's template file by the authors Y.Y. Ryvkind *et al.* (2021)

During task completion, pupils visit and analyse web-sites on various topics, such as the National Library of Ukraine for Children, the Ukrainian environmental club “Green Wave”, and the Kyiv pupils Olympiad in computer science. These tasks fulfil the managerial function of the textbook by familiarising pupils with Ukrainian youth communities and helping them gain a deeper understanding of their country. Exposure to the achievements of Olympiad participants motivates and encourages pupils to pursue their own accomplishments. Pupils are offered differentiated tasks to create web pages using Hypertext Markup Language, including text with various formatting, image insertion, borders, and links. Pupils initially work with template files, accessed via QR code or hyperlink (Fig. 1), download the files, and observe how the web page changes after they write the corresponding HTML code (fulfilling the developmental, managerial, and digital technology application functions of the textbook). The tasks are at basic, intermediate, advanced, and high levels of learning achievement, ensuring the fulfilment of the formative function of the textbook. In the second topic, “Automated Tools for Creating and Publishing Web Resources”, pupils learn about specialised web editors, specifically WYSIWYG editors, and web content management systems. Online site construction systems such as Google Sites and Weebly are mentioned. Among the listed systems, one is prohibited in Ukraine.

The authors describe the sequence and various methods for creating a website using the Google Sites service. Working with this resource requires an account, which pupils created in 7th grade. This implements the interconnectivity of the educational material. Template files are available for practical tasks via QR code or hyperlink. The textbook material contains a detailed and structured description of the Google Site control elements (Fig. 3). Figure 3 shows a table explaining the purpose of the control elements in the “Insert” tab of the web page editor. It includes elements such as “Text Box” for entering and formatting text, “Images” for inserting pictures from Google Drive, URLs, or a computer, and “Embed” for adding objects via HTML code or links. There is also “From Drive” for inserting documents, “Layouts” for selecting the arrangement of objects, “Table of Contents” for automatically creating a list of headings on the page, “Image Carousel” for slideshows, and “Divider” for adding horizontal lines. The table serves as a guide for working with these tools while editing web pages. The authors have focused on the practical component of the topic's study and, in the end, propose completing a comprehensive practical task. The following discusses the textbook on information technology by N.V. Morze & O.V. Barna (2021). The educational material in the “Creating and Publishing Web Resources” section is presented in two topics: 1) automated systems for creating and publishing web resources; 2) creating a web page using Hypertext Markup Language (Fig. 4).

Призначення елементів керування вкладки Вставити

Елемент керування	Призначення
 Текстове поле	Створення блока введення тексту. Текст може бути оформлений як Назва, Заголовок, Підзаголовок, Звичайний текст і Малий
 Зображення	Уставлення зображення з Google Диска, за URL-адресою з Інтернету, з носіїв даних комп'ютера тощо
 Вставити	Уставлення об'єктів різних типів з Інтернету за їх URL-адресою або вставлення фрагментів HTML-коду
 З Диска	Уставлення документів різних типів з Google Диска
 Макети	Вибір макета розміщення об'єктів на сторінці
 Зміст	Створення змісту сторінки. Зміст формується автоматично із заголовків, розміщених у текстових полях на сторінці, та призначений для швидкого переходу до вибраного заголовка на поточній сторінці
 Карусель зображень	Створення слайд-шоу з вибраних зображень
 Роздільник	Уставлення горизонтальної роздільної лінії

Figure 3. Structured description of educational material

Source: excerpt from the textbook by Y.Y. Ryvkind *et al.* (2021)

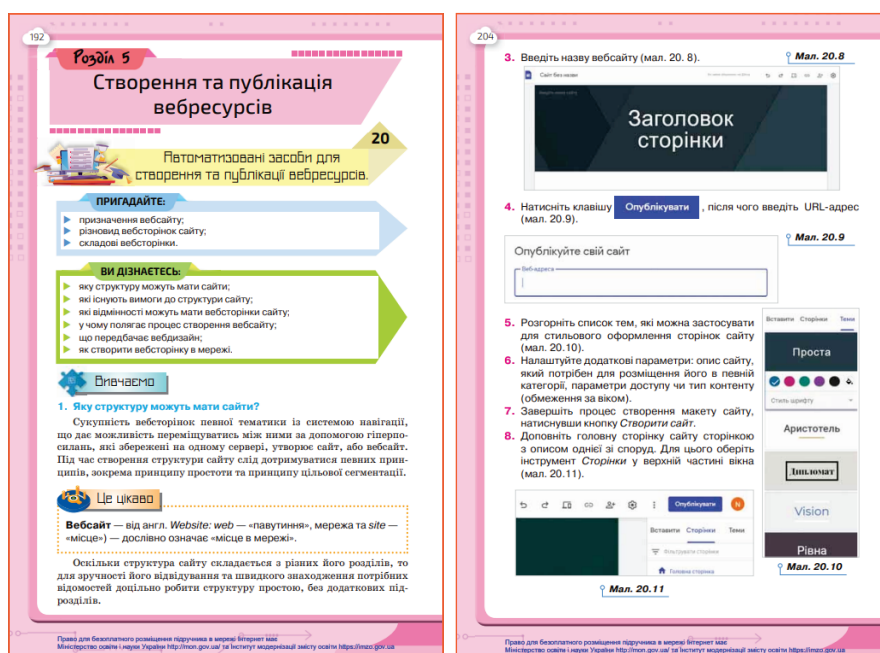


Figure 4 shows two pages from a textbook. The left page (192) is titled 'Розділ 5 Створення та публікація вебресурсів' (Section 5: Creation and publication of web resources). It includes a list of tasks for students to complete, such as 'пригадайте' (recall), 'ви дізнаєтесь' (you will find out), and 'вивчіть' (study). The right page (204) shows a screenshot of a website editor interface with numbered steps for creating and publishing a website, including 'Введіть назву вебсайту' (Enter the website name), 'Натисніть кнопку Опублікувати' (Click the Publish button), and 'Розгорніть список тем' (Expand the list of topics).

Figure 4. Structured description of educational material

Source: excerpt from the textbook by N. V. Morze & O.V. Barna (2021)

The lesson topics are presented in the form of questions, such as what structure websites can have, how to create a simple HTML document, and the answers to which pupils will receive in the lesson. Authors N.V. Morze & O.V. Barna (2021) propose, in the informational component of the educational section, the study of the following terms: website; internal and external website structure; linear, hierarchical, and arbitrary internal website structure; banner; ergonomic website; web design; content; HTML; static and interactive (dynamic) web pages; site management system; website section page; script; SEO,

SMO. In the first topic, pupils learn the answers to the questions: what structure websites can have; what are the requirements for website structure; what differences can website pages have; what is the process of creating a website; what does web design involve; and how to create a web page on the internet.

The website structure is considered as a complex system of several key components: directory structure, navigation structure, and the necessity of a website splash page. As an example of an arbitrary internal website structure, pupils are directed to the website of the Library of

Ukrainian Literature, and as an example of a web directory, to a website with a library of audiobooks, thus fulfilling the value-based function of the textbook (Listen, 2024). In explaining the ergonomic requirements for a website, the authors highlighted the importance of the main page and its role among other pages of the site. For example, “the main page of the website should satisfy the “3 by 3” rule, that is, three paragraphs of three sentences about the theme and content, authors, and purpose of the website” (Onyshchenko & Moroz, 2024).

In the “Take action” section, the authors have developed detailed instructions for creating a website about amazing structures using Google Sites, through which pupils, by engaging in activity, master the basic principles of working with modern digital tools and recognise the importance of participating in the development of virtual space as a full-fledged member of the global digital community. The “Work in Pairs” section contains tasks using the words “formulate”, “discuss”, “exchange opinions”, and “is it possible to assert”, which promotes the development of pupils’ creativity, encourages analysis, synthesis, drawing conclusions, and expressing their own opinions. Pupils demonstrate acquired knowledge, analyse the characteristics of professional and amateur websites, provide examples of website designs, reflect on website popularity, and more.

In the “Work Independently” section, tasks are provided to find websites of educational institutions located near your school or websites of online stores that sell computer equipment online. There are also tasks to create personal websites using the Google Sites service about pupils’ hobbies, rare animals and plants, or a website about a project implemented by your class during lessons or

extracurricular activities. In the second topic, educators explore the questions: what does the markup code of a web page look like in HTML; how to create a simple HTML document; how to format text in an HTML document; how to work with lists in an HTML document; how to work with images in an HTML document; and how to build hypertext links in an HTML document.

It is worth noting that pupils, using the textbook materials, will gain practical skills in using text formatting tags, placing images and links, and will also become familiar with creating numbered and bulleted lists, and internal links within a web page. The authors have focused on the topic of creating links, which is difficult for pupils to understand, namely: how to correctly write the path to a page located in the current folder, what a relative address is, and how to write a label name and link it to a link for navigation within the page. The team of authors provides pupils with a list of colours for ease of completing practical tasks, explaining the correspondence between the font size measurement units of the “size” attribute in numerical values and points. The text size in web design is measured in whole numbers from 1 to 7, which does not provide an understanding of how large the text will be on a web page. The correspondence in points, presented in the textbook, which are used as text size measurement units in text editors, allows pupils to understand which number to write to achieve the desired size. In the “Work in Pairs” section (Fig. 5), pupils are encouraged to familiarise themselves with and compare an online guide (Introduction, n.d.) and a practice tool (HTML Examples, n.d.); a valuable resource for exploring web page formatting examples (HTML Editor, 2015) is also provided (fulfilling the managerial function).

Працюємо в парах

- Обговоріть, які відомості, подані на сайті за адресою <https://goo.gl/bC3WD4>, доповнюють матеріал підручника.
- Обговоріть, як можна застосувати онлайнний підручник (https://www.w3schools.com/html/html_intro.asp) та онлайнний тренажер (https://www.w3schools.com/html/html_examples.asp) з мови HTML у своєму навчанні. Наведіть одне одному свої пропозиції. У чому відмінність цих ресурсів?
- Обговоріть, як можна використати приклад форматування веб-сторінки (мал. 21.6) на сайті <https://htmlg.com/html-editor/> для створення власних вебсторінок. Хтось висловлює припущення, а хтось — перевіряє його. Потім міняєтесь ролями.



The screenshot shows the HTML Editor website. On the left, there is a text editor with the text "You can edit this demo text!". Below it, there is a table with two columns: "Tag" and "Description". The table lists various HTML tags and their uses, such as "Active styles", "Setting margins", and "Using active styles". On the right, there is a code editor showing the HTML code for the demo text editor.

Figure 5. Section “Work in Pairs”

Source: excerpt from the textbook by N.V. Morze & O.V. Barna (2021)

Pupils are provided with a list of group projects, such as “Professions of the Future” and “Famous People of Our Region”, for creation in HTML. The task suggests collaboratively creating a website and deciding, for example, who will create a web page for which profession. The proposed educational projects contribute to the development of computer science competencies through the knowledge-based, activity-based, and value-based components of the expected learning outcomes for 8th-grade pupils.

ANALYSIS OF AUTHORIAL METHODOLOGIES FOR TEACHING WEB TECHNOLOGIES IN 8TH GRADE

A comparative analysis will be made of the presentation of teaching material in the previously discussed informatics textbooks for 8th-grade pupils. Developers N.V. Morze & O.V. Barna (2021) present educational material on the topic “Creating and Publishing Web Resources” per the curriculum: pupils first study automated tools for creating and publishing web resources and then become acquainted with the concept of Hypertext Markup Language. Authors Y.Y. Ryvkind *et al.* (2021) propose constructing the educational process in a different order: first, study Hypertext Markup Language, and then automated web page creation tools. These are methodologically different approaches to teaching web technologies to pupils. In the authors’ opinion, it is important to explain to pupils how a page is created using tags, and then use Google Sites to construct complex websites with embedded elements.

Both author teams begin explaining the educational material with structure. Y.Y. Ryvkind *et al.* (2021) focus on the structure of a web page, describing the web page through navigation, design, and content elements, while N.V. Morze & O.V. Barna (2021) focus on the structure of a website, teaching the internal and external structure of the site, examining static and dynamic pages, and dwelling on the concept of “home page” in detail; they introduce pupils to website markup, content, and publication, the main components of web design (style, layout, technologies, presentation, purpose); and provide advice to novice web designers, in which role 8th-grade pupils find themselves.

The author teams have different approaches to explaining website ergonomics: they present rules and recommendations, such as placing no more than three columns of content on a page, preventing the appearance of horizontal scroll bars on web pages, etc.; or they explain ergonomics through specific characteristics of website visitors: expectations, age, habits, technical capabilities, and level of knowledge. All authors have chosen Google Sites for practical work on creating and publishing websites using automated systems. This is a free and simple builder that allows pupils to customise website templates, select colour schemes and font styles, and insert objects on web pages.

When teaching pupils the Hypertext Markup Language, the author teams emphasise the ability to view and analyse the page source to understand HTML tags and their attributes. The educational materials contain a large number of examples of Ukrainian websites, highlighting

the importance of pupils’ participation in the activities of the global internet community of Ukraine and the world. Y.Y. Ryvkind *et al.* (2021) have developed a convenient table with brief explanations of the actions performed by the control elements on Google Sites (Fig. 3). N.V. Morze & O.V. Barna (2021) have covered more Hypertext Markup Language tags, which allow for diversifying practical tasks, making them interesting and useful. In the “Work in Pairs” section, the authors have provided pupils with useful practical advice on familiarising themselves with an online textbook and practice tool, and a virtual resource with page formatting examples. It is worth noting that the authors use the terms “parameters” and “attributes” interchangeably when referring to tag properties; a summary at the end of the topic and a list of questions are not provided. Educational online resources are an effective supplement and expansion of educational opportunities in teaching web technologies. These web resources include virtual learning environments and online courses, which can significantly improve the efficiency of organising and conducting the educational process, activate pupils’ independent learning, and facilitate blended and distance learning. For 8th-grade pupils, the following online resources are recommended:

1. Educational channel by O. Pasichnyk (2022) on site builders “Creating a Website on Weebly.com” and “Online Website Builder Strikingly”. This resource will be useful for both pupils and teachers who want to quickly and efficiently create their own educational web resource.

2. Educational videos by A. Bukach (2024) on creating and publishing web resources using Google Sites.

Thus, the educational content of the “Creating and Publishing Web Resources” topic, presented in the reviewed computer science textbooks for 8th-grade pupils, covers the main aspects of creating and publishing websites and promotes the development of pupils’ practical web development skills. Using textbooks in web technology lessons in conjunction with modern digital tools will contribute to the development of pupils’ critical thinking, creative abilities, and responsible attitudes towards internet use, as well as successful preparation for pupils’ professional self-determination.

CONCLUSIONS

The author of this article has analysed a range of scientific and educational-methodological publications on innovations and trends in computer science teaching methodology in general secondary education institutions at the current stage, particularly focusing on the use of digital textbooks. The analysis has identified and summarised psychological and pedagogical factors and highlighted relevant tasks for the transformation of the content and procedural components of computer science education in secondary school, which is a fundamental aspect of computer literacy.

The analysis of educational material from the “Creating and Publishing Web Resources” section for 8th-grade pupils indicated that the educational content is sufficient and

up-to-date for pupils to acquire basic knowledge on this topic. The competencies and practical skills obtained enable pupils in general secondary education institutions to realise their potential in developing web pages and websites, from simple HTML markup language designs to complex websites with embedded elements developed using automated site builders with modern technologies.

Textbook authors used a variety of educational methods to present the educational material, ranging from the theoretical foundations of HTML to creative projects involving website creation using online builders. Significant emphasis is placed on practical tasks that help pupils master theoretical knowledge and develop useful digital skills for creating their own web pages. Authors actively use

modern technologies, such as QR codes, online services, and interactive resources, which contribute to increasing pupil motivation and interest in the subject. The prospects for further research are aimed at studying the possibilities of implementing modern digital educational technologies in the computer science education process through the creation of new educational environments and the development of methodologies for their application.

ACKNOWLEDGEMENTS

None.

CONFLICT OF INTEREST

None.

REFERENCES

- [1] Bukach, A. (2017). *How to create a website?*. Retrieved from <https://surl.li/beorle>.
- [2] Buts, K.O., & Popovkina, A.S. (2022). *Gender analysis of school textbooks*. *Scientific Notes of Young Scientists*, 9.
- [3] Bykov, V., Burov, O., Gurzhiy, A., Zhaldak, M., Leshchenko, M., Litvinova, S., Luhovyi V.I., Oliynyk, V.V., Spirin, O.M., & Shishkina, M.P. (2019). *Theoretical and methodological foundations of informatization of education and practical implementation of information and communication technologies in the educational sphere of Ukraine*. Kyiv: Komprint.
- [4] HTML Editor. (2015). Retrieved from <https://htmlg.com/html-editor/>.
- [5] HTML Examples. (n.d). Retrieved from https://www.w3schools.com/html/html_examples.asp.
- [6] Kholmatov, A. (2023). *Pedagogical technologies in teaching students about web programming*. *Journal of Pedagogical Inventions and Practices*, 25, 40-44.
- [7] Korshunova, O.V., Zavadskyi, I.O., & Stasiuk, Z.R. (2021). *Informatics: Textbook for 8th grade of general secondary education*. Kyiv: Osvita Publishing House.
- [8] Kosovets, O.P., Soia, O.M., & Krupskyi, Y.V. (2024b). Methods of teaching computer science in a specialized school: Analysis of web technology manuals. *Mathematics, Informatics, Physics: Science and Education*, 1(1), 56-62. doi: 10.31652/3041-1955-2024-01-08.
- [9] Kosovets, O., Kovtoniuk, M., Soia, O., & Koval, D. (2024a). Integration of digital technologies in modeling the educational environment of a bachelor in the conditions of martial law. In *Proceedings of the 12th international conference on applied innovations in IT (ICAIIIT)* (pp. 51-57). Germany: Anhalt University of Applied Sciences. doi: 10.25673/115641.
- [10] Kuo, Y.-T., & Kuo, Y.-C. (2023). African American students' academic and web programming self-efficacy, learning performance, and perceptions towards computer programming in web design courses. *Education Sciences*, 13(12), 1-17. doi: 10.3390/educsci13121236.
- [11] Listen. (2024). Retrieved from <https://sluhay.com.ua/>.
- [12] Minarno, A.E., Syafa'ah, L., & Rahayu, D. (2021). Science and technology for community: Improving web programming skills using laravel framework. *Dedication Journal*, 18(1), 21-26. doi: 10.22219/dedikasi.v18.i1.15590.
- [13] Mohar, A.K. (2019). The materiality of textbooks: From black-and-white textbooks to the digital textbook. *Logos*, 30(2), 26-34. doi: 10.1163/18784712-03002005.
- [14] Morze, N.V., & Barna, O.V. (2021). *Informatics. Textbook for 8th grade. Institutions of general secondary education*. Kyiv : UOVC "Orion".
- [15] Moyseyuk, N. (2007). *Pedagogy*. Kyiv: OJSC "Bila Tserkva Book Factory".
- [16] Onyshchenko, N., & Moroz, N. (2024). Methodological approaches to the formation of information literacy of future primary school teachers using computer-based learning technologies. *Scientia et Societas*, 3(2), 19-27. doi: 10.69587/ss/2.2024.19.
- [17] Pasichnyk, O. (2022). *Creating a website on Weebly.com*. Retrieved from <https://www.youtube.com/playlist?list=PLqrUwUbDyenOn34MqUCxezkacDv-wCWO>.
- [18] Reshevskaya, K.S., Zimmerman, G.A., & Lapkin, A.I. (2024). *Analysis of computer science textbooks for grades 10(11)*. *Topical Issues in Modern Science*, 8(26), 932-941.
- [19] Rodríguez, J.R., & Moreira, M.A. (2017). Introduction: From textbooks to digital teaching materials. *Latin American Journal of Educational Technology – RELATEC*, 16(2), 9-12. doi: 10.17398/1695-288X.16.2.9.
- [20] Rodríguez-Regueira, N., & Rodríguez-Rodríguez, J. (2022). Analysis of digital textbooks. *Educational Media International*, 59(2), 172-187. doi: 10.1080/09523987.2022.2101207.

- [21] Ryvkind, Y.Y., Lysenko, T.I., Chernikova, L.A., & Shakotko, V.V. (2021). *Informatics: Textbook for 8th grade. Institutions of general secondary education*. Kyiv: Genesis.
- [22] Semenovska, L., Vazhenina, I., & Fazan, V. (2023). Individualization of learning as a development actuality information technological society. *Pedagogical Sciences*, 6(2), 30-34. doi: 10.33989/2524-2474.2023.82.295073.
- [23] Tkachuk, H. (2011). *Methods of using educational web resources in the process of training future teachers of computer science*. Uman: Sochinsky Publisher.
- [24] Yatsko, O.M. (2023). Analysis of teaching the elective module "Web technologies" in grades 10-11 of secondary school. *Education. Innovation. Practice*, 11(3), 52-59. doi: 10.31110/2616-650X-vol11i3-008
- [25] Zhaldak, M.I., et al. (2017). *Informatics. Curriculum for students of grades 5-9 of general education institutions*. Retrieved from <https://mon.gov.ua/static-objects/mon/sites/1/zagalna%20serednya/programy-5-9-klas/onovlennya-12-2017/8-informatika.docx>.

Олена Косовець

Кандидат педагогічних наук, доцент

Вінницький державний педагогічний університет імені Михайла Коцюбинського

21000, вул. Острозького, 32, м. Вінниця, Україна

<https://orcid.org/0000-0001-8577-3042>

Аналіз навчального матеріалу з вебтехнологій для учнів базової школи

Анотація. У сучасному інформаційному суспільстві вебсайти є потужним інструментом для навчання, комунікації та взаємодії користувачів. Наявність у шкільній освітній програмі з інформатики теми з вебтехнологій є актуальним аспектом опанування інформатичної компетентності, оскільки готує молодь до життя в цифровому світі та сприяє розвитку національної економіки. Метою дослідження було здійснити аналіз навчальних підручників з інформатики та виявити основні тенденції у методиці навчання вебтехнологій учнів базової школи. Для досягнення визначеної мети використано комплекс теоретичних методів, такі як аналіз, систематизація та узагальнення науково-методичної та навчальної літератури, методів навчання та застосування сучасних цифрових засобів у процесі навчання вебтехнологій. Проведений аналіз навчального матеріалу з теми «Створення та публікація вебресурсів» у підручниках з інформатики для учнів 8 класу свідчить про достатність та сучасність освітнього контенту для формування базових знань з даної тематики. Виявлено, що компетенції та практичні навички, набуті учнями, забезпечують можливість реалізації їхнього потенціалу у розробці вебсторінок та сайтів – від найпростіших проєктів, створених мовою розмітки HTML, до складних вебсайтів з інтегрованими елементами, розроблених за допомогою автоматизованих конструкторів сайтів із застосуванням актуальних технологій. Значна увага приділялась практичним завданням, що сприяли закріпленню теоретичних знань та розвитку корисних цифрових навичок зі створення власних вебсторінок. Автори активно використовували сучасні технології, такі як QR-коди, онлайн-сервіси та інтерактивні ресурси, що сприяє підвищенню мотивації та зацікавленості учнів до вивчення предмета. Результати дослідження можуть бути використані в освітньому процесі як у загальноосвітніх школах, так і в спеціалізованих навчальних закладах для підготовки учнів до роботи з вебтехнологіями

Ключові слова: методика навчання інформатики; навчальний підручник з інформатики; функції навчального підручника; цифрові технології; навчальний процес