

# WEB ORIENTED EDUCATION COURSE DESIGN MODEL IN THE ENTREPRENEURSHIP EDUCATION SYSTEM

**Lyudmila Pet'ko, Dragomanov National Pedagogical University (Ukraine)**  
**Liudmyla Popova, Dragomanov National Pedagogical University (Ukraine)**  
**Olena Kulyk, Pereiaslav-Khmelnyskyi State Pedagogical Grygorii Skovoroda  
University (Ukraine)**  
**Larysa Kardash, Pereiaslav-Khmelnyskyi State Pedagogical Grygorii  
Skovoroda University (Ukraine)**  
**Liudmyla Ovsienko, Borys Grinchenko Kyiv University (Ukraine)**  
**Iryna Denysiuk, Pavlo Tychyna State Pedagogical University (Ukraine)**  
**Olena Proskurniak, Kharkiv Humanitarian-Pedagogical Academy (Ukraine)**

## ABSTRACT

*Development of information and communication technologies determines improvement of interaction forms of pedagogical process participants in the system of entrepreneurship education. Web technologies are becoming particularly important, in pedagogical and balanced uses of which there are possibilities to integrate the syllabus, information and communication technologies, pedagogical technologies in the information and educational environment of a general secondary education institution. The benefits of using web-oriented technologies are as follows: student access to educational materials anytime, anywhere where there is an Internet connection; availability of educational services; availability of feedback from the teacher; use of multimedia dynamic educational content; developing students' self-study skills. Implementation of the main provisions of the study is aimed at improving the existing information education in general secondary education institutions by designing and creating web-oriented education courses in computer science and other subjects that can be used to generalize and systematize application of web-oriented technologies in the educational process, to improve professional level of computer science teachers.*

**Keywords:** Web-Oriented Education Course, Entrepreneurship Education, Swot Analysis, Information and Educational Environment, Informatization of Society.

**JEL Classifications:** M5, Q2.

## INTRODUCTION

Improving accessibility and quality of educational services is essential for development of education. The use of modern information and communication technologies in the educational process in a harmonious combination with methodological heritage of the past makes it possible to form knowledge and skills in students at general secondary education institutions that will become the basis for many professions. Pedagogically thoughtful use of tools in the educational process ensures linking of the syllabus with everyday life.

The use of online resources influences students' perceptions of organizing a web-oriented education process. To create effective communication and collaboration conditions the teacher needs a modern educational environment. Using a computer-based system for managing educational resources helps solve a number of educational problems, including accessibility of educational resources, collaboration and communication between participants in the educational process.

The process of informatization of education requires formation of new methodological systems of education, focused on formation of knowledge and skills needed for successful self-realization, and creation of a new information and educational environment, the use of which provides necessary conditions for teaching students.

In this regard, determining perspectives of using web-oriented technologies in the process of teaching various subjects, in particular, computer science, their role and place in organization of the educational process, methodological bases of their application is a pressing problem of theory and methodology of teaching various subjects using modern information and communication technologies in education. To solve it, scientifically and methodologically justified pedagogically balanced use of web-oriented technologies in the process of teaching computer science is necessary.

The purpose of the research is to theoretically substantiate and develop components of a web-oriented methodological system for teaching computer science to high school students and to experimentally test effectiveness of their use.

## **REVIEW OF PREVIOUS STUDIES**

The process of developing educational standards for teaching natural science and mathematical subjects, including computer science, is currently underway in general secondary education institutions (Papadakis et al., 2017; Wang et al., 2017; Bezkorovaina et al., 2019).

In this regard, the problem of using web-oriented technologies in teaching computer science requires thorough research, and its study is connected with contradictions:

Between the increasing level of informatization of society and inefficient use of information and communication technologies in general secondary education institutions (Goesser et al., 2018; Virtanen et al., 2018; Harashchenko et al., 2019).

Between the objective need for the use of web-oriented e-learning resources in general secondary education institutions and the lack of readiness of computer science teachers to use web-oriented technologies in the educational process (Drobyazko et al., 2019a; Drobyazko et al., 2019b; Holinska et al., 2019).

Between possibilities of using web-oriented technologies in the process of teaching computer science and other subjects, lack of appropriate methodological training systems (Tetiana et al., 2019; Hilorme et al., 2019).

## **METHODOLOGY**

The following research methods were used to solve the set tasks: theoretical: analysis of scientific and pedagogical references on introduction of information and communication technologies (ICT) into the educational process; analysis of state regulations, curricula, web-oriented resources, software; comparing, studying and generalizing pedagogical experience in improving the process of teaching computer science in general secondary education institutions;

analysis of current curricula of optional courses at the subject oriented training stage in order to justify components of a web-oriented methodological system for teaching computer science.

## RESULTS AND DISCUSSIONS

Development of ICT determines improvement of forms of interaction between participants of the pedagogical process. Of particular importance are web technologies, in the pedagogically thoughtful use of which there are possibilities of integrating the syllabus, information and communication technologies, pedagogical technologies in the information and educational environment of a secondary education institution.

In the study the information and educational environment of a general secondary education institution is considered as a system consisting of a set of subsystems (educational resources) that are used for information exchange between participants of educational process on the basis of modern web-oriented technologies.

The main place in the author's model of the structure of the information and educational environment of a general secondary education institution is given to the web-oriented educational environment of the general secondary education institution, created through the system of educational materials management, where registered students get access to education courses.

The concept of a web-oriented educational environment of a general secondary education institution has been clarified, which we consider as an environment on the basis of which through the pedagogically thoughtful use of web-oriented technologies conditions for learning and cooperation of teachers and students are created.

To communicate and collaborate with students the teacher requires a modern learning environment based on an educational materials management system, introduction of which in a general secondary education institution will help improve effectiveness of the educational process management.

For students who regularly attend an education institution, use of this model of information and educational environment can play an ancillary (additional) role and be a basis of the educational process for those students who do not attend an education institution due to protracted illness or during quarantine.

The study clarifies the concept of a web-oriented education course – it is an electronic education course that contains education materials created using web technologies with the purpose to ensure achievement of didactic goals. Such courses in general secondary education institutions can be created and deployed using web-oriented education materials management systems.

At the same time, there are problems associated with the choice of a single educational materials management system within the education institution, which should be carried out on the basis of a careful analysis of advantages and disadvantages of such systems. In the study the choice of educational materials management system MOODLE is due to the following considerations: saving costs for purchase of software; availability of resources regardless of operating system, types of computer hardware, location; increasing opportunities for organizing collaboration and communication; reducing the problem of data storing and back-up, availability of a large community of users and programmers developing new functional applications for this system.

An important place in creating a web-oriented education course belongs to pedagogical design. By "pedagogical design" we understand a systematic approach to developing an

education process, on the basis of which it is possible to build a unified system for the purposes of education, education materials and tools intended for delivery of education materials.

By means of pedagogical design it is possible to increase a cognitive capacity of students, to increase the volume and effectiveness of acquiring the education material, to facilitate development of an effective educational process, motivating students to continuous self-development and self-improvement. Under such conditions, the key role in the process of preparing students for the use of ICT in the education process belongs to the teacher.

Developer's (teacher's) tools or authoring tools is called software for creating, editing, reviewing, testing, storing a received electronic resource in different formats. To such electronic resources belong original multimedia documents that are static in structure and become dynamic when used. Creating such a document is about selecting and submitting objects in a specific order of reproduction with a certain level of navigation control available to the end user.

The priority in selecting authoring tools belongs to ensuring deployment of education courses using them in the education materials management system, to export and import education materials in different file formats. The advantage of creating education materials with the developer's tools is not only the speed of development, but also the ability to reproduce them in any of the education materials management systems.

Recently general secondary education institutions have been using a flipped classroom technology. The section compares traditional and flipped approaches to teaching, distinguishing them by several criteria: student's role, teacher's role, methods used and lesson structure, place in the education process.

Analysis is a necessary element of research, an obligatory preliminary stage in case of drawing up any level of strategic and marketing plans. SWOT is an abbreviation of the first letters of the words: strengths, weaknesses, opportunities, and threats. The data obtained from the situational analysis are the basic elements in the process of development of the company's strategic goals and objectives. The object of SWOT analysis can be any product, company and project.

SWOT analysis is also used in education. Let's build a matrix (Table 1) consisting of strengths and weaknesses, opportunities and threats of using web-oriented technologies.

Depending on the results obtained, a plan should be drawn up to use advantages and opportunities, as well as to eliminate weaknesses and neutralize threats. Due to combinations of elements of analysis, certain strategies are formed. Based on these, it is necessary to choose the right direction for development of the use of web-oriented technologies.

When designing a web-oriented education course, the following stages are identified: determining the purpose of the course; selection of educational materials; structuring and logical systematization of educational materials; development of pedagogical scenario for the course; choice of web-oriented developer tools for course development; use of web-oriented developer tools for course development; testing a web-oriented education course; writing guidelines on how to use the web-oriented education course; approbation of web-oriented education course in computer science class in general secondary education institutions.

<b>Table 1</b>	
<b>WEB-ORIENTED TECHNOLOGY ANALYSIS (AUTHOR'S RESEARCH)</b>	
<b>Strengths</b>	<b>Weaknesses</b>

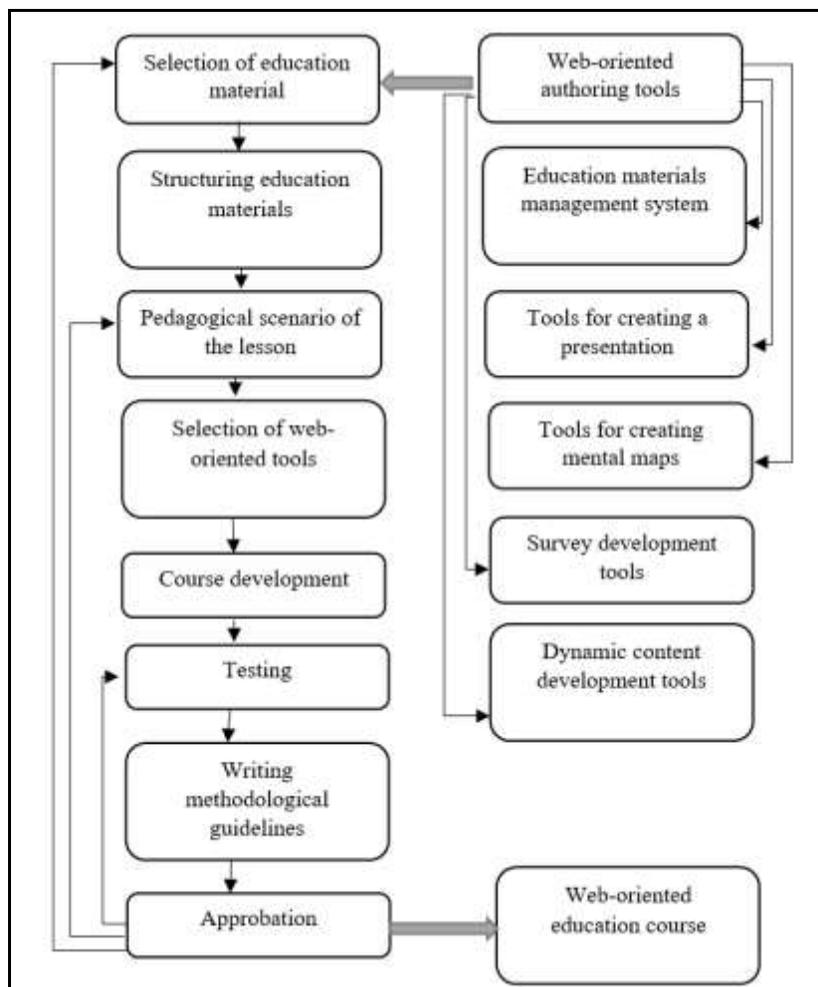
use of educational ICT technologies; access to education materials anytime; students who missed a class know what material was studied in class; prompt distribution of education material; affordability of education; use of various forms of presentation of education materials; opportunity of rational allocation of time in the process of studying; availability of feedback from the teacher; use of multimedia dynamic content; use of visual presentation of education material; application of pedagogical design; cooperation of teachers and students; enhancing the cognitive capacities of students; learning using mobile devices; development of independent learning skills of students; formation of the image of an educational institution.	The use of web-oriented technologies is still a matter for technical and software experts, not teachers and students; high complexity of developing web-oriented courses; administering the education content management system by teacher; used rarely, haphazardly, mainly to control knowledge and to develop reproductive skills; continuous updating, modification and improvement of course content; overloading with functions and tools that are inconsistent with the learning course goals; complexity of measuring effectiveness of using a web-oriented education course; controversy over the choice of an education management system; lack of motivation for teachers to create web-oriented courses.
Opportunities	Threats
study from anywhere; use by students at time of an illness, quarantine; preparation of students for participation in the Olympiads; methodology should be evolutionary and gradual as it has to take into account rapid changes in the information society; updating or changing the content of the course by the teacher; use of multimedia technologies; automated control, evaluation, diagnostics of congesting the content; a variety of learning resources can be added to an education course through the education management system; opportunity of repeated return to the content.	unavailability of the Internet connection; a course is developed by IT specialists who lack understanding of issues related to education and pedagogy; requirements for the teacher's professional training, the scope of his knowledge, communication are increasing; insufficient number of certified web-oriented courses; social isolation of course users; appearance of "low quality" training in education institutions; filling the course with copied text from textbooks or books; identification of students during testing; use of educational technology by teachers for the sake of technology, not to achieve an educational goal.

The advantages and disadvantages of using web-oriented technologies in general secondary education institutions are analysed. Among the benefits of using web-oriented technologies are the following: access of students to education materials anytime, anywhere where the Internet connection is available; availability of educational services; availability of feedback from the teacher; use of multimedia dynamic educational content; developing students' independent learning skills.

The study also revealed disadvantages of using web-oriented technologies in general secondary education institutions, in particular: high complexity of web-oriented training courses development; the haphazard use of ICTs, their predominant use for the purpose of controlling students' knowledge and development of reproductive skills; an overloading with functions and tools that are inconsistent with the goals of the course; problems with the choice for a general secondary education institution of an education materials management system; weak motivation of teachers to create web-oriented education courses.

The main hypothesis of the study is the assumption that design of web-oriented education courses in computer science, other educational subjects and their development on a scientific and pedagogical basis and modern information technologies will allow to generalize and systematize the use of information and communication technologies in the education process of a general secondary education institution and increase professional level of teachers.

Let's consider the general model of designing a web-oriented education course in computer science (Figure 1).



**FIGURE 1**  
**DESIGN MODEL OF A WEB-ORIENTED EDUCATION COURSE (AUTHOR'S DEVELOPMENT)**

At the stage of defining the purpose of designing a web-oriented education course, the goals of learning, pedagogical objectives, basic didactic functions, principles should be determined, adherence to which makes the learning process more meaningful and increases its effectiveness.

At the stage of selecting teaching materials, the teacher analyses the syllabus and its structure. The teacher selects such concepts, definitions, and examples, illustrations, the use of which would allow the students to see, hear and understand the basic semantic content of the education materials. The education material should be clear, but it should not be too simple, as it can lead to loss of attention by students.

Structuring and logical systematization of the education materials mean that the study material is divided into parts in such a way to ensure logicity, validity and expediency of presenting educational information. Based on the analysis of selected education materials, a system of questions and tasks, a comparison of the learning results and the level of knowledge that is achieved according to the requirements will be developed.

At the stage of structuring the education materials, it is necessary to divide the selected materials according to the created structure and perform its visualization (preparation of presentations, video lessons, etc.).

During development of a pedagogical scenario, the teacher uses a web-oriented course design model. Types of educational activity utilizing web-oriented courseware developer tools, as well as the ways and forms of feedback should be identified. A web-based course model displays its structural components. Following didactic principles, the teacher considers components of the course.

At the stage of selecting a web-oriented toolkit for developing a course, the possibilities of using these tools are analysed.

During the project implementation phase, practical work on designing individual components of a web-oriented education course using developer tools is carried out.

During the testing phase of a web-oriented education course, it is important to identify errors or inaccuracies, as they usually occur. It is necessary to check whether the developed resources are reproduced in the education management system. Identify errors in texts, examples, tests. The teacher performs in-depth checks of the pedagogical plan before the course is used by the students.

Writing methodological guidelines on how to use a web-oriented education course is an obligatory design stage. This is a list of guidelines on how to organize the course work for teachers and students. These are also various memos, directions, recommendations for completing assignments, solving tasks, answering test, etc.

Trying out a web-based education course in a computer science class at a general secondary education institution. The developed course is tested to identify deficiencies in the added resources and their content. In the process of working with the course by the students the pace and efficiency of mastering educational materials should be monitored, questions, shortcomings and inconveniences while working with the resource should be fixed. At the stage of course approbation in educational practice the teacher can evaluate its pedagogical efficiency and make necessary changes for use in further educational process.

## **RECOMMENDATIONS**

There are different styles of perception of educational materials, so there are students who are better at perceiving information through vision, they need to see images, observe to analyse its various aspects and study the relevant phenomena. For some students, audio materials (sound, voice) are more suitable.

The texts that the teacher uses when creating presentations or a file in .pdf format should be: clear, structured. The material on the pages should be presented in an accessible, understandable language. Excessive use of underscores, highlighted words and sentences in bold should be avoided. The lecture material in a text form should contain at least 10,000 letters per academic hour, along with graphs, pictures and tables. Texts from textbooks, manuals should not be just copied as they are. The teacher should work it over: make short sentences; structure information and keep the scope; pick the key points, terms, explanations.

There is also a group of students who have motion perception, such children need to explore, check, move, feel. In this regard, in the process of reviewing and studying materials on each topic it is recommended to use tables, diagrams, videos, sound, research and, especially, descriptive training materials.

It is also important to keep the style consistency in presenting the course materials. The use of fonts of different sizes, too many colours, pictures distracts students from perceiving the essence of the phenomena and objects being studied.

## CONCLUSIONS

Web-oriented technologies are used in the development of content-based, activity-based and summary blocks of web-oriented education courses. Using an education course developed using web-oriented developer tools can be useful and appropriate addition to a traditional classroom-based system of organizing educational process at a general secondary education institution.

Using such a structure allows for a clearer definition of the process of designing a web-based education course.

The following stages of designing a web-oriented education course in computer science are distinguished: defining the purpose of teaching, selection of educational materials, structuring and logical systematization of educational materials, development of a pedagogical lesson scenario, selection of web-oriented developer tools for course development, application of web-oriented developer tools for course development, testing a web-oriented education course, writing methodological guidelines for using a web-oriented education course, approbation of a web-oriented education course in computer science classes at general secondary education institution.

Appropriate software is required to provide the course. At the same time, lack of funding for educational institutions on the one hand and increased control over the use of licensed software led to transition to the use of freely distributed software.

At the approbation stage of the web-oriented education course, it was proposed to computer science teachers from general secondary education institutions to become experts of the web-oriented education course "Basics of webpage slicing and web programming". According to the suggested lessons of the course, the experts identified the positive aspects of using such a course in teaching computer science and recommended to introduce it in general secondary education institutions, to develop methodological recommendations for the use of web-oriented technologies for teachers.

Web-oriented education course designed specifically by a teacher considering the age and psychological features, can be used not only to supplement learning, but also to prepare students of general education institutions at the out-of-class activities for the annual Olympiad in computer science (programming), office technology, web design, computer graphics and computer animation.

The completed research does not settle all aspects of the set problem. The following areas of research may be promising: application of web-oriented technologies in teaching natural science, mathematics and other subjects in general secondary education institutions; use of cloud or fog technologies for their use in teaching computer science in general secondary education institutions.

## REFERENCES

- Bezkorovaina, O., Kulyk, O., Ovsienko, L., Pet'ko, L., Soichuk, R., Turchynova, G., & Stanislavchuk, N. (2019). Entrepreneurship education of future travel managers. *Journal of Entrepreneurship Education*, 22(6).
- Droblyazko, S., Makedon, V., Zhuravlov, D., Buglak, Y., & Stetsenko, V. (2019a) Ethical, technological and patent aspects of technology blockchain distribution. *Journal of Legal, Ethical and Regulatory Issues*, 22(2S).

- Drobyazko, S., Potyshniak, O., Radionova, N., Paranytsia, S., & Nehoda, Y. (2019b). Security of organizational changes via operational integration: Ensuring methodology. *Journal of Security and Sustainability Issues*, 9(1), 1595-1612.
- Goeser, P.T., Hamza-Lup, F.G., Johnson, W.M., & Scharfer, D. (2018). VIEW: A virtual interactive web-based learning environment for engineering. *Advances in Engineering Education*, 1-24.
- Harashchenko, L., Komarovska, O., Matviienko, O., Ovsienko, L., Pet'ko, L., Shchokolova, O., & Sokolova, O. (2019). Models of corporate education in the United States of America. *Journal of Entrepreneurship Education*, 22(3).
- Hilorme, T., Tkach, K., Dorenskyi, O., Katerna, O., & Durmanov, A. (2019). Decision making model of introducing energy-saving technologies based on the analytic hierarchy process. *Journal of Management Information and Decision Sciences*, 22(4), 489-494.
- Holinska, T., Komarovska, O., Melnyk, O., Pet'ko, L., Shpitsa, R., Sova, O., & Strohal, T. (2019). Cloud technologies in art entrepreneurship education. *Journal of Entrepreneurship Education*, 22(5).
- Papadakis, S., Kalogiannakis, M., Orfanakis, V., & Zaranis, N. (2017). The appropriateness of scratch and app inventor as educational environments for teaching introductory programming in primary and secondary education. *International Journal of Web-Based Learning and Teaching Technologies*, 12(4), 58-77.
- Tetiana, H., Chernysh, O., Levchenko, A., Semenenko, O., & Mykhailichenko, H. (2019). Strategic solutions for the implementation of innovation projects. *Academy of Strategic Management Journal*, 18(1).
- Virtanen, M.A., Haavisto, E., Liikanen, E., & Kääriäinen, M. (2018). Ubiquitous learning environments in higher education: A scoping literature review. *Education and Information Technologies*, 23(2), 985-998.
- Wang, M., Cheng, B., Chen, J., Mercer, N., & Kirschner, P.A. (2017). The use of web-based collaborative concept mapping to support group learning and interaction in an online environment. *The Internet and Higher Education*, 34, 28-40.