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## Web-quest as a pedagogical stimulation of students' positive motivation for mental work

**Formulation of the problem.** The dominant tendency of the XXI century civilization is the global informatization of society. Accordingly, there is an informatization of education, which facilitates the transition from the mechanical learning of students to their ability to acquire new knowledge independently, in particular using the Internet. However, students' work with information resources on the Internet is not always effective: it all depends on the nature of the motives that determine the student's personality activity, its orientation, meaningfulness and satisfaction. Therefore, pedagogical stimulation of students' positive motivation for mental work is important. In carrying out pedagogical stimulation, the teacher of the higher education institution must adhere to a humanistic position in the choice of stimuli, which is based on respect for the student's personality, belief in his abilities, positive reinforcement of his actions and aims at forming motives for mental work. Pedagogical stimulation of students' positive motivation for mental work in the

process of teaching mathematical disciplines is in unity with the process of activating their mental work. The greatest effect in the activation of mental work is given by the situations of creating their own product, as well as situations in which students have to defend their own opinions, independently select the tasks in their power, find several possible options for solving the problem, organize all the necessary conditions for self-examination and analysis of personal practical actions. The creation of such situations should be ensured by web quest technology, since the didactic model implies independent search work on the web sites of the world with the subsequent presentation of the results which makes the sense of their own research while designing them.

**The objective of the article** is to reveal the content of the Web-quest technology for its use in mathematical preparation of students to form a positive motivation for mental work.

**Analysis of recent researches and publications.** The analysis of previous researches suggest that the introduction and use of the web-based quest in the educational process of higher education institutions is the focus of teachers, methodologists and scientists.

The web-quest was first proposed in 1995 by San Diego University teacher Bernie Dodge and his student Tom March. Scientists introduced the concept of web quests as quests using information and communication technologies and the Internet. The first web-quest model developed was used in many training courses around the world. Professor of Educational Technology at San Diego State University, Bernie Dodge, defines a web-quest as a landmark activity where virtually all information is taken from the Internet [7, p. 6].

The fast-paced web quest technology has gained popularity among American and European technologies, and since the 1990s began to spread in Ukraine and Russia. Nowadays, scientists are actively studying the following aspects of this pedagogical innovation: psychological and pedagogical bases of application in the educational process (G. Shamatonova, V. Schmidt); opportunities in the individualization of learning in order to enrich additional knowledge (Ya. Bykhovsky, A. Khutorskoy); the importance of educational environment in the implementation of the concept of a new organization (O. Baguzina, D. Grabchak, M. Zaikin, T. Putiy).

Not only the theoretical developments of the above-mentioned authors but also their practical activities to promote this technology as the basis of the project-based and problem-learning method played an important role in the dissemination of the web-based technology.

**Presentation of the main research material.** Analysis and synthesis of publications data of domestic and foreign researchers has allowed to establish that the concept of “Web-quest” does not have a single approach to interpretation. Thus, W. Schmidt understands a web-based quest for a mini-project based on finding information on the Internet [6, p. 138].

T. March defines the web-quest as a learning structure that uses links to important online resources and authentic tasks to motivate students to explore the problem. This develops students’ ability to work in a group as well as individually, the ability to manage information and transform it into a deeper understanding [12].

In the interpretation of O.G. Shevtsova, the web quest acts as a solution-oriented activity. In this case, most or all of the information is taken from the global information network [11].

G.L. Shamatonov sees the web-quest as an interesting Internet journey, emphasizing that such work involves queries in various search engines, obtaining a large amount of information, analyzing and organizing it with its further presentation. In fact, within the framework of the didactic structure, a teacher forms the students’ search activity, sets its parameters and determines the time limits of this activity. That is, a web-quest is an interactive process in which students acquire necessary knowledge [10].

E.I. Baguzina believes that a web quest can be called an informative virtual didactic platform for the application of different technologies and teaching methods, above all, of constructive problem-search character that can be embedded in a specific course of study [9, p. 97].

Researchers O.L. Gapeyev and M.S. Grinevich, note that the web quest is a resource-oriented technology, the purpose of which is to independently search the information necessary for performing mental work [2].

Svetlana Katerzhina in her works under the technology of the web quest understands the technology of navigation on hyperlinks, which allows to create various educational systems, and they, in turn, can be the basis for organizing different forms of distance education [5].

G.A. Vorobyov interprets the web quest as a web project with some of the information or all the information that the student works with located on different websites [1].

A. Yakovenko reveals the concept of a web-quest as a problematic task with elements of a role-playing game that is performed through the use of Internet resources. That is, web-quests can be presented in the form of hypertext, presentation, or website that, through the use of external and internal hyperlinks and embedded objects, enables students

to demonstrate the logic of solving a problem with consistent refinement, as well as to identify other ways of its implementation [ 8].

In his research, N. Kononets interprets the web quest as a set of methods and techniques of research, during which students search for information through online resources. Web-quest allows you to work in groups of 3 to 5 students, develops leadership qualities of the student, increases not only the motivation for mental work, but also the responsibility for the results of their activities [6].

Based on the scientific work of Ukrainian scientists R.S. Gurevich and M. Yu. Kademina all forms of web-quests can be divided into the following three groups:

- according to the duration of implementation (short and long term ones);
- according to the type of tasks (translation, compilation puzzles, journalistic, design, creative, self-cognitive, common problem solving, analytical, evaluation, scientific);
- according to the subject matter (mono-projects and cross-curricular projects).

Web-quest technology according to B. Dodge has the following structure [9, p. 97]:

1. An **introduction** that provides an overview of what is being researched and motivates students to complete the assignment. The introduction clearly describes the roles of the participants, the plan and content of the work of the web-quest, as well as a series of questions, which are answered by the participants of the web-quest.
2. A **task** that is relevant to the interests of students and is understandable. In this part of the web-quest, the result of the students' research work is noted.
3. A **list of links** of online resources that are required to complete the task.
4. **Description of the procedure of work** in the form of an algorithm of actions (teacher's methodological recommendations).
5. **Description of evaluation criteria** for the web-based quest, which take into account: the degree of independence of students' work, creative approach to the task, report on the results of work, quality of presentation, answers to the questions of students from other groups, made after the report.
6. **Conclusion**, which summarizes the performance of the research task.

This structure is a basic one that can be modified if necessary, but in each educational web quest the following four elements must be present: introduction, task, performance, evaluation.

While implementing the quest Natalia Kononets proposes to allow students to work as an analyst, web designer, information architect, surfer, and a project leader [6, p. 142-143]. We provide a brief description of each of these roles.

- **Analyst** – explores online resources related to the topic of the Webquest. The task of the analyst is: to analyze the usefulness of each of the sites during the study of discipline; to identify the features of each site; to highlight sections that are relevant to the discipline site and sections that should not be borrowed.
- **Web-Designer** – designs and creates web sites. He should familiarize himself with the colors that can be used for the background of the pages, the fonts that are appropriate for the headings and the main text.
- **Information Architect** – deals with the structuring of the sites and information that will be presented on it. His purpose is to facilitate the user to search and manage information on a web page or a web site; choose a convenient web page layout (effective layout of text and graphics elements).
- **Surfer** – navigates the web to search for information. His job is to find useful online resources for students, links to which can be found in the presentation of the web quest.
- **Project Manager** – distributes roles between team members, assigns tasks to each of the team members, checks their implementation, provides overall guidance to the web quest.

Let us consider the steps of working on a web quest.

*In the first stage*, the teacher introduces the topic of the web-quest to students and formulates the problem. The topics are selected in such a way that during the work on them the student deepens his knowledge in the subject under study or acquires new knowledge. Students divide their roles in a team: 1-4 people per 1 role. All students should help each other, teach each other in case of difficulty while working with programs.

*In the second stage*, the students' research skills are formed during the task. The process of finding answers to the questions raised develops the ability to compare and analyze, to classify objects and phenomena, to think critically. Students acquire the skills to analyze scientific information and transform it to solve problems.

*In the third stage*, the results of the activities are processed, during which the conducted research is considered. The work of students involves selecting the most relevant information and presenting it in the form of a webpage, website, slideshow, booklet, animation, poster or photo report. A teacher plays an important role as a consultant.

*The fourth stage* involves discussing the results of work on the projects. Summing up is appropriate in the form of a conference so that students have an opportunity to show their work. The team nominates a student to defend the project. During project defense, responsibility for the work done, self-criticism, and the ability to speak to the audience are laid.

Let us analyze how a web-quest helps to increase student motivation.

*Multimedia* greatly improves the psycho-emotional mood in learning. Illustrative colors the material, makes the process of mastering knowledge more attractive, promotes the formation of positive emotions, gives confidence.

*Modality* (use of more channels of information perception). The visualization of the material being studied creates the conditions for the development of memory, language, makes knowledge open, has great educational power and is an effective diagnostic tool.

*The structured presentation of the training material* (implemented through hyperlinks, which facilitate the organization of clear logical connections) facilitates a holistic understanding of the subject under study; opens the opportunity for the student to build an individual educational direction.

The *searchable* nature of the web-based technology quest allows you to activate students' research. Using Internet resources offers great opportunities in choosing the source of information. When dealing with a large amount of information, the ability to make choice and be responsible for the choice is realized, to evaluate the effectiveness of the information search performed and to correctly determine the amount of information offered.

*Visualization of work results* (step-by-step work results displayed on screen) makes a clear assessment of students' activity, and makes reflection to be conscious.

Let us consider the example of developing a web-quest on the discipline "Higher Mathematics" according to the theme "Derivative and its application", which is given for first-year students in the majors:

- "Secondary education (Labor training and car issues)";
- "Secondary Education (Furniture Design)";
- "Vocational Education (Transportation)";

- Special Education.

All students were divided into four groups according to the following roles: historians, scholars, researchers, practitioners.

**Role 1. Historians**

You are a historian who will look for historical facts about this topic. You need to find the answers to the following questions:

1. Historical background for the derivative.
2. Name the mathematician who first proposed the term “derivative”.
3. How did the appearance of the derivative influence other mathematical concepts?

*Report format:* video and themed website.

**Role 2. Scientists**

You are the scientists who will be involved in the analysis of theoretical material on the proposed topic. You need to find the answers to the following questions:

1. Definition of the derivative. Table of derivatives of elementary functions.
2. Rules of differentiation of the sum, product and share of functions.
3. The derivative of a complex function.

*Report format:* computer presentation and themed website.

**Role 3. Researchers**

You are a researcher and your responsibilities include:

1. The use of a derivative in mechanics. Applied tasks.
2. Application of a derivative in biology. Applied tasks.
3. The use of a derivative in the economy. Applied tasks.

*Report format:* booklet and thematic website.

**Role 4. Practitioners**

You are practitioners and it is your responsibility to answer the following questions:

1. Select different types of examples for the application of differentiation rules (sums, outputs, and function shares). Make an independent work on the topic.
2. Find different types of examples for finding a derivative of a complex function. Make an independent work on the topic.
3. Select different types of examples to find a derivative of a parametrically given function. Make an independent work on the topic.

*Report format:* self-explanatory videos and a self-help website.

The main criteria for evaluating student performance are as follows.



	<b>Criteria</b>	<b>Justification of the criteria</b>	<b>Points</b>
<i>Content</i>	Understanding the task	- the work demonstrates a complete understanding of the task	14
		- information that is not partially relevant to the topic under consideration is present	7
		- materials that are not directly relevant to the topic are involved	0
	At what extent the topic is revealed	- fully	14
		- partly	7
		- is not revealed	0
	The logic of presentation of information	- logical presentation of the material	14
		- unclear logic	7
		- lack of logic	0
<i>Independent work in a group</i>	Coordinated work in a group	- clearly planned work in a group	14
		- the work of the group is partially planned	7
		- the work of the group is not planned	0
	The degree of independence of the group	- complete independence when doing the job	14
		- partial independence of the group	7
		- independent work of the group	0
<i>Work design</i>	The grammatical correctness of the words, the absence of misspellings and mechanical descriptions	- correct work in terms of stylistics, grammar and spelling	14
		- non-gross mistakes in terms of stylistics, grammar and spelling	7
		- gross mistakes in terms of stylistics, grammar and spelling	0
<i>Work defense</i>	The quality of the report	- argumentation, completeness of results presentation	14
		- unclear logic, incomplete presentation of results	7
		- there are no arguments and research results	0
	The language culture, the manner of talking to the audience	- the speakers confidently stand in front of the audience, speak correctly, follow the rules, hold the attention of the audience	14
		- the speakers make speech errors, slightly break the regulations, partially hold the attention of the audience	7
		- the speakers do not speak to the audience, they violate the regulations, they do not speak correctly, they cannot hold the attention of the audience	0
	Answers to questions	- the speakers confidently and thoroughly answered the questions	14



		- the speakers may partly answer the question	7
		- the speakers cannot answer any of the questions	0
	Volume and depth of knowledge on the topic	- speakers demonstrate erudition, display cross-curricular relationships	14
		- the speakers present the material correctly, but do not demonstrate sufficient knowledge	7
		- the speakers do not show complete mastery of the material	0
	Volitional qualities of speakers	- speakers strive for high results, are ready for discussion, are friendly and outgoing	14
		- the speakers are ready for discussion, but do not always show kindness	7
		- the speakers are not ready for discussion, they are aggressive	0

The maximum score is 154. To determine the grade, the score should be divided by 11.

After completing all the steps of working on the web-quest and defending its results, we offered to answer the questionnaire.

The questionnaire aimed to identify the degree of enrichment of the students' experience in completing the web-quest and to find out the attitude of students to this activity, and included 7 questions:

1. What did you learn while participating in the web-quest?
  - a) search for additional sources of information (Internet resources)
  - b) work in a group
  - c) analysis of available Internet resources
  - d) all of the above components
  - e) did not gain any new skills
2. Do you see the possibility of further use of the acquired skills in the future life?
  - a) yes
  - b) no
3. Would you like to study web quest technology in the future?
  - a) yes
  - b) no
4. What did you fail to do?
  - a) to analyze the Internet resources
  - b) search for additional Internet resources
  - c) work in a group
  - d) all of the above components
  - e) everything worked
5. Are you satisfied with the work of other students in the group?

- a) yes
  - b) no
  - c) no, because some students did not work at full strength
  - d) yes, but some students might work better
6. Are you satisfied with the assessment?
- a) yes
  - b) no
  - c) the estimate is fair, but could be higher
7. Do you qualify for evaluation?
- a) yes
  - b) no
  - c) generally yes, but some adjustments should be made

Analysis of the answers to the first question showed that the majority of students in the web-quest learned to do different activities: finding additional sources of information – 8%, working in a group – 43%, analyzing available Internet resources – 10%, all components together – 34% , did not get any new skills – 5%.

The analysis of the answers to the second question showed that the majority of students see the possibility of further use of the acquired skills – 93%.

The results of the answers to the third question showed that 81% of students would like to work with web-quests in the future, and 19% of students do not have this desire.

Summarizing the students' answers to the fourth question, we should mention that 65% of students had no problems completing the web-quest; 23% of students had difficulty finding additional Internet resources; 6% of students had difficulties in group work; 6% of the students surveyed experienced problems while analyzing online resources.

The results of the answers to the fifth question showed that 71% of students were satisfied with the work of other group members; 14% of students were not satisfied with the work of other students because they did not work effectively; 15% of students were generally satisfied with the work of other classmates, but believed that individual students might have worked better.

The distribution of students in relation to the points received was as follows: 87% of students were satisfied with the points; 6% of students expressed dissatisfaction; 7% of students would like to increase their points.

Analysis of students' answers to the seventh question showed that 96% of students were satisfied with the assessment criteria and could

evaluate themselves, and only 4% of students said that some adjustments should be made.

**Conclusions.** Web-quest technology accumulates elements of problem, project, game and group learning, meet many of the requirements of modern higher education. The technical and multimedia capabilities of the digital environment contribute to its smooth penetration into the educational process of higher education institutions and to the formation of students' positive motivation for intellectual work.

The task of the teacher is to select interesting topics for the project according to the curricular, which will involve all students of the academic group, to determine the implementation plan and to evaluate the completed task. Sharing control over the outcome of a web-quest will increase your motivation for thinking while learning mathematical disciplines.

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### Abstracts

**IWANOWA HALYNA. Web-quest jako środek pedagogicznej stymulacji pozytywnej motywacji studentów do pracy umysłowej.** Artykuł poświęcony jest rozważeniom nad wykorzystaniem technologii Web Questu w matematycznym przygotowaniu studentów do kształtowania pozytywnej motywacji do pracy umysłowej. Badana jest struktura Web Questu. Podkreśla się, że w każdym edukacyjnym Web Queście muszą znajdować się 4 elementy: wprowadzenie, zadanie, wykonanie, ocena. Przedstawiono klasyfikację wszystkich form Web Questów. Wyróżniono główne etapy pracy nad Web Questem.

**Słowa kluczowe:** motywacja, stymulacja pedagogiczna, praca umysłowa, web quest, technologia, projekt, dyscypliny matematyczne, zasoby internetowe.

**ІВАНОВА ГАЛИНА. Веб-квест як засіб педагогічного стимулювання позитивної мотивації студентів до розумової праці.** Стаття присвячена розгляду особливостей використання технології веб-квесту в математичній підготовці студентів для формування позитивної мотивації до розумової праці. Розглядається структура веб-квесту. Підкреслюється, що 4 елементи повинні бути обов'язково присутніми в кожному освітньому веб-квесті: вступ, завдання, виконання, оцінювання. Наводиться класифікація

всіх форм веб-квестів. Виокремлюються основні етапи роботи над веб-квестом.

**Ключові слова:** мотивація, педагогічне стимулювання, розумова праця, веб-квест, технологія, проект, математичні дисципліни, Інтернет-ресурс.

**ИВАНОВА ГАЛИНА. Веб-квест как средство педагогического стимулирования положительной мотивации студентов к умственному труду.** *Статья посвящена рассмотрению особенностей использования технологии веб-квеста в математической подготовке студентов с целью формирования положительной мотивации к умственному труду. Рассматривается структура веб-квеста. Подчеркивается, что 4 структурных компонента должны обязательно присутствовать в каждом образовательном веб-квесте: введение, задания, выполнение, оценивание. Приводится классификация всех форм веб-квестов. Выделяются основные этапы работы над веб-квестом.*

**Ключевые слова:** мотивация, педагогическое стимулирование, умственный труд, веб-квест, технология, проект, математические дисциплины, Интернет-ресурс.

**IVANOVA HALYNA. Web-quest as a means of pedagogical stimulation of students' positive motivation to mind work.** *The article is devoted to the consideration of peculiarities of the use of web-quest technology in the mathematical preparation of students for the formation of positive motivation for mental work. The structure of the web-quest is considered. It is pointed up that 4 elements must be present necessarily in every educational web-quest: introduction, assignment, execution, evaluation. The classification of all forms of web-quests is given. The main stages of working on a web-quest are stood out.*

**Keywords:** motivation, pedagogical stimulation, mental work, web-quest, technology, project, mathematical disciplines, Internet-resource.