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Chemistry Web Quests in Distance Learning

Summary

This article is devoted to innovative learning technology, namely web quest, an effective learning tool that promotes the cognitive activity of applicants for higher medical educational institutions, focused on today's challenges related to forming an independent, creative, competent personality. The main attention is paid to using quests in studying chemical disciplines in distance learning.

The purpose of the study is to identify the main aspects of web quests' effectiveness in the training of future medical professionals, revealing the main stages of the organisation. Specific examples of quests are also given from my own practical experience.

An analysis of recent publications on this issue was carried out, and as a result, we argue that scientific sources do not sufficiently cover use of web quests in the study of chemical disciplines in higher medical education institutions, which is the impetus for the study.

The article presents the stages of organising quests for students in the discipline "Medical Chemistry", which include both the actual creation of a blog (initial, thematic, address, final), as well as the choice of topic, goals, tasks, division of responsibilities between participants and publication of results during distance learning (online conferences, videos, projects, booklets, commercials, prevention essays).

It is presented an analysis of a survey of teachers and students on the effectiveness of the introduction of this technology in the training of future medical professionals. The analysis of the results shows that web quests meet modern requirements for implementing the educational process in medical and educational institutions and contribute to acquiring professional competence. Teachers and students who participated in the survey noted that web quests are an effective modern technology that promotes motivation, interest in the subject and

chosen profession, and the formation of key competencies that must have a modern medical professional to be competitive.

Specific examples of involving students in web quests on the subject of "Medical Chemistry" during research activities in the scientific section of Cherkasy Medical Academy.

Keywords: innovative technologies, web quests, competence, research activities, institutions of higher medical education, "Medical Chemistry"

1. Introduction

In today's economic, political, and humanitarian crises, society is increasingly raising demands on young professionals in any field of activity. Military aggression is also a global problem, affecting education as well. In such realities, special attention is paid to the medical field, which is a key segment and indicator of the well-being of society. It is difficult for students to organise their education and realise personal and professional development prospects in such conditions. An urgent problem teachers of higher education institutions solve is the use of innovative methods and forms of education that are effective in the online educational process. It is pretty difficult to increase motivation and quality learning in distance education with classical teaching aids, therefore during the pandemic and now martial law, teachers use such modern technologies that enhance the cognitive activity of students, expand scientific horizons and areas of interest,

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help organise and focus on gaining new knowledge. Education contributes to the realisation of these problems and the formation of the future personality in the profession.

The study aims to analyse the effectiveness of innovative learning technology in higher medical education, namely, web quests; separation of stages of organisation of web quests; giving specific examples of practical activities in the teaching of chemical disciplines in institutions of higher medical education.

To achieve this goal, the theoretical research method was used, such as the analysis of normative documents and scientific papers; and the empirical method, namely a survey of teachers and students in the Google Form, and an experiment was conducted with the introduction of web quests when attracting students to research activities while working in a scientific section.

2. Analysis of Scientific Works

It should be noted that the use of Internet resources is not the latest learning tool. However, scientists are constantly improving and expanding the possibilities of using information technologies that contribute to the search for the necessary information at home, the ability to analyse it and isolate fake (false) information, develop the ability to systematise the data obtained, effectively solve the tasks, develop an interest in the chosen profession and promote a scientific worldview. Modern information and communication technologies are now a priority in education, in the organisation of which the Law of Ukraine guides teachers in Higher Education. Such technologies provide not only the acquisition of knowledge and skills but also contribute to their implementation in the future profession. All that forms the general and professional competencies of future medical professionals, namely the ability to abstract thinking, analysis and synthesis; the ability to process information; the ability to adapt and act in new conditions; ability to analyse their own activities and organise the provision of medical care to the population, etc.

Note that scientists offer a variety of interpretations of the definition of “web quest”. The founders of educational web quests describe them as a specific lesson format in which students receive information from the Internet and state that such classes develop

the ability to analyse and evaluate material (Dodge, 1997). Researcher I. Sokol notes that in the general sense, the quest is a special learning technology that includes specific methods, forms and tools. The author’s opinion is correct that web quests are modern and innovative and contribute to the search for information and its assimilation and enrichment of knowledge in various fields (Sokol, 2016). It should be noted that O. Ilchenko states that web quests contribute to improving the teacher’s skills, which not only provides information but helps acquire skills in students for self-search and assimilation of the material. The researcher emphasises that web quests are not an isolated technology, they are inextricably linked with education, and through them, there is a transformation of educational material (Ilchenko, 2017). Scientists O. Babenko and O. Komar rightly point out that the use of web quests is the orientation of young people to research and such technology is effective in the study of natural sciences, one of which is chemistry (Babenko, 2018). Many scholars hold a different view and believe that web quests are a journey on the Internet, a set of sites united by subject, a platform for tasks, and a specific lesson format. In the study, we believe web quests are an innovative educational technology using Internet resources. Thus, the analysis of the works of scientists allows us to assert that web quests are actively used in the modern educational process. At the same time, insufficient attention is paid to the problems of implementing this Internet technology in training future medical workers.

3. Organisation of Web Quests in Higher Education Institutions

It is an indisputable fact that the use of project-based learning, information and communication technologies increases the efficiency of the educational process and promotes optimal mastering of educational material in institutions of higher medical education. Note that the key segment in web quests is the independent search for information by students using the Internet. In this aspect, teachers should teach young people to systematise, analyse information and use it effectively. Independent search for information stimulates future medical workers to expand their scientific horizons, creative manifestations, and elaboration

of a large number of sources, which involves the formation of medical competence during training. Web quests can be organised in small groups and with a whole group of students, but a small number of people will be more effective if one teacher conducts the quest. Interdisciplinary web quests, which cover several disciplines, are very appropriate in institutions of higher medical education. Such quests contribute to the acquisition of medical knowledge, their implementation in future professional activities, and promote the individual's self-realisation. The effectiveness of such technology is evident in distance learning, as most information can be obtained only through the Internet when limited access to school and the library and, most importantly, the quest itself is online, and its product can be presented online. These can be projects about certain diseases with information available to people with non-medical education, presentations on healthy lifestyles, commercials on the use of useful natural products, videos on quality analysis of medicines, analysis of the survey of people's willingness to visit a pharmacy or health care facility/medical laboratory, virtual tour on historical medical monuments, preventive essays, informative booklets on seasonal vitamin deficiency, online conferences, forums, webinars, etc.

During the preparation for the web quest, the teacher must compile a structural map of his work, which indicates: the topic, key tasks, main stages of work organisation, conclusions indicating the knowledge and skills acquired by students after the quest and forms of publishing search results. An important and integral segment is the development of stages of organisation of students' work. Such a plan can be discussed on the Google Met platform, Zoom, to which participants of the future web quest will join. Mandatory segments in it are coordination of the theme and purpose of the quest, detailed distribution of tasks between project participants, setting deadlines, intermediate verification of processed information, during which the teacher focuses on more important issues, helps in analysing material, presenting research results in the mentioned forms (online conferences, projects, videos, booklets, commercials, questionnaires, etc.) effective during distance learning. After discussion and adjustments, everyone receives a document and has the opportunity to work it out and clarify individual details at the participants'

forum. Such partnership conditions contribute to the effective implementation of tasks, forming a creative personality, and taking into account the medical direction of training; in the future effective teamwork, because the activities of a medical worker involve consulting, discussion with the involvement of specialists of a narrow profile.

After discussing the plan for the development of the web quest, move on to the direct organisation, which includes the creation of a blog on the Internet. We offer general stages that can be used as a template or basis and modified depending on the topic, purpose, and subject:

1. Initial – create own blog on Blogger.com, using a Google account that every student already has, as distance learning has been going on for two years. With Blogger, one can change the name in the game during the quest.
2. Thematic – choose the blog's topic, and make changes during the project, so the name is not final. For example, in the course of events, there is an emphasis on other issues that should be better placed in the title. Mind that the title should contain keywords, be informative, understandable, and simple.
3. Address Book – choose the URL of the blog or domain name only once and indicate it in Latin letters as the e-mail address. Therefore, one needs to decide on the name and check in the program whether it does not coincide with an existing, busy user.
4. The final stage is the choice of template. At this stage, one can also make changes by choosing different options, such as themes on gadgets, which students can handle without problems. Be sure to click the "create blog" option to save all the steps.

4. Effectiveness of Web Quests in Chemical Disciplines

Chemistry teachers of Cherkasy Medical Academy actively involve students in web quests, rightly believing that such innovative technology contributes to the implementation of modern requirements for the organisation of classes, especially in distance learning, as well as interest in research and is a key lever in the formation of competitive medical specialists.

A survey was organised and conducted for both educators and teachers on the implementation and effectiveness of web quests in the training of future medical professionals. The analysis of the survey results allows us to make the following generalisations: 68,56% of teacher respondents said that web quests are a necessary challenge of time and should be actively implemented in the educational process of training future medical professionals. Among education applicants answering a similar question, 79,56% showed interest in the selected technology. The slight discrepancy is that younger people are more active in using Internet resources and finding information faster. However, when answering the question “Specify whether it is necessary to check information from Internet sources on several indicators?” teachers unanimously said yes, while only one in three students agreed that materials should be checked. Such a low rate among younger people indicates a lack of awareness of verifying information, a labile psyche and minor life experience. It is worth noting that at the beginning of the COVID-19 pandemic, teachers had to devote much time during training sessions to refuting or explaining certain information from the Internet to save the lives and health of not only students but also their families who were confused in front of an invisible enemy and did not understand how to secure their lives. There was also a question in the Google Form survey about the interest in the subject “Medical Chemistry” when using web quests. The analysis of respondents’ answers indicates interest in the discipline. Namely, 66,87% of respondent students said that it was interesting to participate in educational quests, and 71,56% of teachers also said that students were actively involved in the proposed tasks during the implementation of projects. In addition to applying innovative technology in developing educational material, chemistry teachers have actively implemented it in involving future medical professionals in research tasks within the scientific section of chemistry. During the survey, chemistry teachers pointed out that web quests help intensify students’ search activities in the chemical disciplines, development of creative thinking, creativity, motivation to study, self-realisation and self-improvement (73,67% of respondents).

Summarising the analysis of the survey, we can say that chemistry teachers effectively use web quests

at the Cherkasy Medical Academy during the processing of chemical disciplines, and there is an active involvement of students in this type of work in the course of research activities.

From the experience of working at the Cherkasy Medical Academy, we give examples of the organisation of scientific web quests in the processing of the discipline “Medical Chemistry” during the involvement of students in extracurricular activities in the scientific section. For example, during the study of the topic “Biogenic elements”, some problematic issues were brought to self-study within the work of the scientific section and research web quests were organised on the following topics such as “Does life without plastic exist?”, “My biosphere without toxic chemicals”, “Relevance of endemic diseases”. When studying the topic “Chelation in biological systems”, we offer such web quest topics as “Is it possible to replace Ferum in the body with Calcium?”, “Causes of homeostasis”, “Complexions on guard of human life”, and “Chemical composition of COVID-19 protection products”. In particular, when organising a web quest on the topic “Does life without plastic exist?” research tasks were outlined and were solved by applicants for education, namely:

1. Check out the classification of plastics.
2. Outline the main areas of usage.
3. Investigate the chemical composition and labelling.
4. Get acquainted with the ways of disposal.
5. Suggest modern, creative, own ways to reduce the impact of processing plastic products on the environment.
6. Prepare abstracts and take part in the online conference.

It should be noted that each project participant took a very responsible approach to the task and could choose any task he wanted from the list above. However, some changes occurred during the communication, and two participants took part in the conference; one prepared a report and the other a presentation. During the interim consultations on the Zoom platform, students discussed the information received and suggested ways of verification and its relevance. The teacher focused on the materials’ publication dates and scientists’ reflections. Students presented search results at the annual online environmental conference, held remotely using the Google Meet platform.

The scientific web quest “Chemical composition of COVID-19 protection products” aroused great interest among educators and teachers. All participants of the official website of the Cherkasy Medical Academy were acquainted with the results, and information booklets were created. The tasks were as follows:

1. Get acquainted with the ways of transmission of the disease COVID-19.
2. Describe the preventive measures.
3. Study the causes of the disease.
4. Analyse the means of protection available in pharmacies.
5. Get acquainted with the availability of protective means for the population.
6. Get acquainted with the chemical composition of protective equipment.
7. Offer substitutes from available medical supplies.
8. Prepare a booklet and information for the academy website.

We emphasise that the preparation was very thorough because, at the beginning of the pandemic, people were scared, nervous, and could not be sure of the accuracy of the information, which was very little. The project turned out to be inter-integral because practitioners-part-timers from special professional departments helped to analyse significant information. Most importantly, the results have not lost their relevance, but on the contrary, after some time, students offered to conduct a new quest, taking into account the emergence of new medical and scientific information.

5. Conclusions

Thus, web quests help optimise research, search and independent work and develop professional and general competencies of future medical professionals, which include the ability to analyse, find, synthesise, use the information on the Internet, and ensure implementation in future careers. Analysis of the

survey of teachers and students suggests that young people are actively involved in quests (stated by 71,56% of teachers), 66,87% of surveyed applicants for education showed great interest in the outlined technology while fully showing their personal qualities (communication ability, organisational, search, information technology). The organisation of web quests in the study of “Medical Chemistry” takes place with the active involvement of young people in the choice of topic, purpose and publication of the results of the study, which are presented at online conferences, forums, projects, presentations of preventive essays, etc. Web quests during distance learning in higher medical education institutions are an effective, innovative technology that develops the research component of the educational process. In the future, we plan to explore web quests during the continuous development of doctors during their professional activities.

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