

# Algorithm for Implementing Quest Technologies in Research Work with Preschool and Primary School Children

**Tetiana Vasiutina**

Department of Primary Education  
and Innovative Pedagogy  
Dragomanov Ukrainian State  
University, Faculty of Pedagogy,  
Department of Primary Education  
and Innovative Pedagogy  
Kiev, Ukraine

**Yulia Bondar**

Department of Primary Education  
Vinnytsia Mykhailo Kotsiubynskyi  
State Pedagogical University  
Vinnytsia, Ukraine

**Liudmyla Ishchenko**

Department of artistic disciplines,  
preschool and elementary education  
Vinnytsia Mykhailo Kotsiubynskyi  
State Pedagogical University  
Vinnytsia, Ukraine

**Anna Khilya**

Department of Primary Education  
Vinnytsia Mykhailo Kotsiubynskyi  
State Pedagogical University  
Calp, Spain  
anika.line@gmail.com

**Halyna Kit**

Department of Primary Education  
Vinnytsia Mykhailo Kotsiubynskyi  
State Pedagogical University  
Vinnytsia, Ukraine

**Abstract.** The origin of the definition "quest" and the use of quest technologies in traditional education have been well theoretically analysed and substantiated. In particular, a quest could be a type of collective creative work, scientific/educational competitions or excursions in the traditional form of organising educational activities. However, with the transition to digital education, the implementation of quest technology has changed. It continues to be seen as a motivational tool for learning, a creative form of work in the educational programme. But, according to our observations, this type of work is declining in the online format. We will discuss the reasons for this and options for replacing quest technologies in this description.

It is worth noting that in order to achieve the goal of our study, we turned to the basic requirements for organising a Web Quest, recommendations for its design, convenience according to the age category of children, clarity of instructions, etc. The next step was to compare online education technologies that had similar characteristics to the quest (computer games, educational applications and platforms, RPGs, video quests, VR audiences, etc.) This allowed us to draw a conclusion about their common roots and concepts, as well as to understand the reasons for the decline in scientific interest in the topic of the quest itself.

After analysing the available open access publications, we concluded that this is not enough to understand the reasons

for the decline in interest in this form of online work. After all, street quests are still popular. That is why we interviewed students specialising in preschool and primary education who had the opportunity to create Web Quests and participated in them. The feedback from future specialists on the implementation of quest technology in online and offline formats directed us to describe the reasons for refusing this technology in the online format of the educational process and allowed us to confirm the list of possible substitutions for quests for the research activities of preschool and primary school students suggested above.

**Keywords:** higher education, preschool education, primary education quest, teacher training, WebQuest.

## I. INTRODUCTION

Nowadays, there is a wide range of proposals for online activities in education that replicate, imitate or adapt the forms of traditional schoolwork in a digital format. We have seen the development of synchronous and asynchronous courses in various subjects, synchronous lectures, seminars, conferences, and video lectures that can be viewed asynchronously. In addition, we have developed training exercises in core subjects (language, mathematics) and game applications for developing mathematical or reading skills, which are relevant to primary education.

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In vocational and higher education, we can observe a gradual shift towards teaching and learning theoretical or practice-oriented information through digital applications. This does not refer to the development of programming or digital design skills, but to professions related to the real world (mechanic, teacher, lawyer, technician for system repair or installation of solar systems, for example). All these professions require knowledge and, most importantly, systematic practical training. They also require students to be involved in practical activities in a professional environment (for a mechanic at a service station, for a teacher at a school, university or any educational institution, for a lawyer in court or a practicing lawyer's office, etc.) All of this requires time and a high-quality distribution of the load between theory and practice without losing the effectiveness of each piece of information.

That is why quest technologies have attracted our attention. They are presented as a pedagogical technology that combines the ideas of the project method, problem-based and game-based learning, teamwork, and the use of information and communication technologies to develop new forms of learning content development [1].

When using the terminology inherent in the digital world, we speak of a Web Quest, understanding that this type of quest is defined as a guided research activity in which the information used comes in whole or in part from pre-selected Internet resources that focus students' attention on using the information they analyse, synthesise and evaluate [2].

This is what prompted us to search for an answer to the question of interest and practical implementation of quest technologies in the educational process. And in particular, it led to the choice of the topic of our study: an algorithm for implementing quest technologies in research work with children of preschool and primary school age.

The purpose of the study is to theoretically develop and substantiate an algorithm for research work with preschool and primary school children using quest technologies.

## II. MATERIALS AND METHODS

Based on the well-known technologies in the educational process that are effective at all levels of education, we continued to work with quest technologies, setting ourselves the following tasks

- to identify the basic requirements for the organisation of a quest, in particular a Web Quest for teacher training for this activity and in the development of a quest for preschool and primary school children.
- to analyse the advantages and weaknesses of Web Quests in comparison with quests in a real environment and other virtual environments that have similar characteristics to a quest (computer games, educational applications and platforms, RPGs, video quests, VR audiences, etc.)

Thus, at the first stage of this study, we analysed existing theoretical studies on the use of quest technologies in the online format, which, in our opinion, are the closest to implementation in preschool education and primary school.

Further, we drew an analogy with the development of quests in the real environment offered by the Ukrainian educational space. Based on the developed algorithm, we analysed the results of the work of students majoring in primary education and preschool education within the framework of the Educational Hackathon on inclusive topics.

Finally, we drew an analogy between Web Quests and analogues of quests in the digital environment.

## III. RESULTS AND DISCUSSION

Thus, in the course of our work, we found out that international researchers consider Web Quests, for example:

- in terms of the impact of the methodology on learning; assessing the impact on students' attitudes and perceptions; or research on the promotion of higher order thinking and research skills [2];
- in terms of the benefits of Web Quests for learning through the development of cognitive and academic skills, facilitating access to information and increasing motivation, developing problem-solving skills, improving academic performance and logical thinking, learner-centred and discovery-based learning, contextual foreign language learning, specific scenarios for learning any subject embedded in a Web Quest framework [3];
- as such that can be designed to promote autonomous learning and literacy development, improve reading comprehension in a foreign language, help in acquiring knowledge, develop communication skills, promote efficient use of time, provide motivation to learn and enhance cooperation [4].
- as a form of ensuring the effective use of technology to create new learning opportunities and promote the achievements of primary school students [5].
- as a finished product - for example, an original app designed to combine typing exercises and interactive games for primary school children [6].

The most important part of implementing a Web Quest is that participants are actively involved in an activity, situation or problem from real life, which changes passive learning into a more constructive way of learning and allows them to access new knowledge by discovering, interpreting and building this new knowledge based on their previous understanding of the experience [3].

It is also worth noting that [7] distinguishes between

- short-term Web Quests, which, according to researchers, are better suited for individual work, have time limits of up to two meetings, and the purpose of short-term Web Quests is particularly focused on developing or using lower-level thinking skills in the area of knowledge and skills learning;
- long-term Web Quests are more often used for group work, last a maximum of several meetings, and the main goals are to develop problem-solving and critical thinking skills, allowing students to analyse knowledge and show understanding of the material by creating something that others can respond to.

This approach, in our opinion, resembles a project activity. Therefore, as we continue to explore the topic of Web Quests, we have come to its structure. Thus, the structure of the quest has the following components:

- an introduction that includes background information;
- tasks that tend to inspire;
- a network of information resources needed to complete the tasks;
- an explanation of the process that students need to go through to complete the tasks;
- the actual process of completing the quest, which includes the steps that were prescribed in the task. There is a specific sub-stage of instructions on how to organise data, i.e., queries or guidelines for completing tasks, maps or diagrams;
- evaluation, which should be clearly linked to the objectives stated in the assignment or introduction;
- conclusions. A part that is similar to the closing of a story, summarising the achievements after completing the learning process - the quest. This part may also contain some final questions for reflection and additional references for in-depth study of the topic [7], [8].

If we look at the proposed structure of a Web Quest, in particular, the task page, which contains information about what the student should do, as well as links to learning resources and materials to be mastered with the help of this task [7], we move on to an educational, search or project activity that will not meet the user's (student's) request for a quest. After all, a quest is an action game that requires research, puzzles, non-standard tasks, and manipulations that will keep you in the game.

That is why, in the 2020-2021 academic year, in the process of interaction with students majoring in "013-Primary Education" and "012-Preschool Education", we offered to work in two stages.

The first stage included the actual work of students on completing a Web Quest in the speciality Inclusive Education, which was intended to both summarise the knowledge acquired in the subject and deepen students' understanding of certain elements of accessibility of the environment, materials, administrative and human resources [9], [10]. We proposed 3 phases of the quest. The first of them took place during an online meeting where we offered information about the quest, its purpose and emphasised the importance of attention in the teacher's work, which also had a significant impact on the success of the quest. Since 13 students out of 56 did not read the conditions of the 2nd stage and had to ask for a "hint from the audience". Based on the results of the "room hint", another 6 students were identified who had skipped the second stage, which affected their overall grade (as a result of their absence during the first starting interaction). This also made it possible to assess their low activity during the second stage - the development of their own Web Quest.

The second stage included the development of their own Web Quest for primary school students as part of the Educational Hackathon, which took place in teams [11].

The results of this part of the work can be found at the corresponding link in the list of references. In addition, the audience and jury members were involved in evaluating the work of the student teams, voting anonymously. However, the results can be seen in the corresponding menu list on the Educational Hackathon website. In addition, the general results of the groups were shared in the Inclusive Education social network group, which contributed to the activity of the participants and their creative approach to the second part of the tasks.

For example, during the first stage, we gave students the opportunity to participate in a Web Quest, understand its functions and components. We explained how to create materials, and at the end of the quest, we discussed the problems and difficulties that arose and that may be difficult for primary school children. It was this discussion that was key to understanding the availability of methodological materials and allowed us to consolidate the material we had learned in our own projects at the second stage. In other words, we fulfilled the tasks of the inclusive cycle disciplines and expanded the digital capabilities of students, which was in line with the issues of accessibility in the digital inclusive educational space.

Also, given such a feature of the quest as accessible sources of information and links prepared by the teacher as a facilitator of the process, we have two main advantages - students save time searching for the information they need [3] and in the game content we can check the quality of assimilation and understanding of the information offered for study. This is what we talked about above.

In our opinion, other forms of quests used in various fields are also interesting. For example, we can mention CS50 PuzzleDay, which is held annually and is being worked on by the course team, which updates the content and looks for new interesting questions and forms of interaction, expanding the range of participants through the introduction of new projects and training around the world. This project is about programming, but it gives you the opportunity to expand your knowledge on other topics that become "inspirations" for developers and help you understand the essence of Web Quests in their specific form and natural environment.

An example of a Ukrainian Web Quest was the Museum in the Dark in Kyiv, which until early 2022 was implemented as a project and had a free online part, during which anyone could try to test their senses for perception of information from the world around them using a laptop, computer or phone. Since 2022, the online format of the Web Quest has been unavailable, but in 2024 you will be able to use this programme for a fee. Thus, we have a good example of the functioning of a Web Quest project after its official completion. Of course, these are just two examples of Web Quests that have been developed by teams of specialists and continue to operate.

Other Web Quests offered by Ukrainian colleagues are usually highly specialised and static, which reduces their value as the information space is updated. In addition, as we have previously noted, turning a quest into a project or research activity reduces the interest in participation, particularly among children. After all, in this case, it becomes more interesting for children to take part in a quest

that takes place in the schoolyard, allowing them to run around in search of the truth and solve problems.

Also, if we go back to our process of working on Web Quests. As part of our introduction to virtual reality applications, we developed the Rat Race. It was implemented in the 2021-2022 academic year before the start of military aggression. This stage was implemented as part of the educational hackathon and participation in the Mentoring programme of the Media Literacy Workshop "New tool - new opportunities: meet AltspaceVR" 3.0! This event required serious preliminary preparation, taking into account the technical capacity of the Web Quest participants, additional testing of the functionality of transitions from room to room and buttons that launched the interaction of participants with quest questions, etc [12].

Each room of the virtual reality quest "Rat Race" contained information that students knew, but at the same time it was encrypted in the game space so that students demonstrated awareness of important aspects for inclusive education. That is why students who did not include all their senses, attitudes, and intellects found themselves on a desert island and had to return to the previous step in search of the "right" choice. In conclusion, there was a discussion of the issues raised in each room to assess the inclusion and understanding of the basic principles and provisions of inclusive education by students.

Despite the interesting experience of all three stages of Web Quests, we came to the conclusion that this type of work cannot replace the main educational process. After all, the process of creating, checking the functioning of transitions, buttons and correctness of answers is quite labour-intensive. Problems arise already at the preparation stage when choosing a form, applications and game platforms that would make the process of obtaining a quest key simple and the interaction with information intuitive.

That is why, after analysing the results of three stages of Web Quests based on the specialities of Primary and Preschool Education, we came to the conclusion that the difficulties in organising such activities in the online format remain quite serious for teachers. Therefore, in our opinion, Web Quests should not be used as the main technology in the educational process, but as a technology of non-formal education for in-depth study of a subject or profession in general. Also, given the extensive preliminary work on the implementation of Web Quests, it is worth considering this technology as a type of project or grant activity to achieve a quality result and the functioning of the development even after the project is completed. After all, high-quality Web Quests do not leave the audience indifferent and tend to be used not only by developers, but also by professionals or teachers who are interested in this topic.

In general, observing the upward trend in the market of gaming applications for computers and smartphones, we understand that such forms of interaction as computer games, educational applications and platforms, RPGs, video quests, VR audiences, etc. are quite common today. Both adults and children play these game variations of a search, research and exploration nature. Some applications are used by teachers, but often to achieve the goal of a particular topic or area of education that is relevant at a given time. For example, we can mention the applications Minecraft, Roboblocks, which are quite well-known today

and have dozens of variations in use by computer science teachers or children's clubs (non-formal education). Video quests are currently offered by non-formal education teachers to engage the audience and encourage participation in professional development programmes (individual teachers on the Na Urok platform, etc.). But, in fact, the share of educational content in such games, applications, and meetings is small, as we have previously noted, because it requires high-quality development and, most importantly, the availability of resources for its implementation from idea to implementation.

#### IV. CONCLUSIONS

We analysed the main aspects of Web Quests and their analogues in the digital world. It is also worth noting that we did not dive into the analogues of the digital world, as this is a separate research topic that requires an in-depth analysis of the educational component of the content. But, according to our observations, this segment of educational activity has a low interest in use among teachers. After all, for quest technologies in the distance education format, the availability of resources, time, and, in fact, the teacher's readiness to implement a complex Web Quest project on the subject matter are important. Its support from conception to implementation, support at all stages, checking the functionality, correctness of answers, and the actual functioning of the project upon completion of interaction with students.

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