

ТЕОРІЯ ТА МЕТОДИКА НАВЧАННЯ

DOI: <https://doi.org/10.28925/2312-5829/2026.1.11>

UDC: 378.147:004.738.5:37.091.33

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Webquest “Educational path. revolution” as a gamified tool for teaching pedagogy: implementation design and pilot evaluation

***Abstract.** The article presents the results of the development and pilot testing of the author's multi-user webquest "Educational Path. Revolution", intended for studying the history of pedagogy, theory and methods of education,*

as well as pedagogical communication in higher education institutions. The relevance of the study is due to the growing role of digital and gamified forms of learning in higher education, especially in the conditions of a blended and distance education process. The purpose of the work is to describe the design of the implementation of the webquest and the initial evaluation of its perceived didactic value. The study was carried out in the design-based research format, which combined the stages of conceptualization, iterative design, technical implementation and product testing in real conditions of an educational session. 14 higher education applicants from the Faculty of Psychology of V. N. Karazin Kharkiv National University participated in the pilot study. An author's questionnaire with 6 quantitative indicators and an open question was used for evaluation. The results showed high levels of cognitive interest ($M = 4.6$), task clarity ($M = 4.6$), and intention to reuse the product ($M = 4.7$). The lowest level was related to the effectiveness of team interaction ($M = 3.0$), which indicates the need for further development of cooperative mechanics. The practical significance of the study is to substantiate the possibilities of using a webquest as an interactive digital tool to increase student engagement, activate cognitive activity, and diversify teaching methods of pedagogical disciplines. The conclusion is made about the conceptual potential of a webquest as a tool for increasing engagement, supporting learning motivation, and meaningful learning of pedagogical material.

Keywords: *gamification, webquest, higher education, pedagogy, design research, digital learning*

Introduction

The current stage of higher education development is characterized by intensive digitalization of the educational process, increased demands on student motivation, and the need to form professional competencies of future teachers and psychologists in a dynamic information environment. Traditional lecture-seminar forms of education increasingly fail to provide a sufficient level of involvement and deep assimilation of the material, especially in disciplines that require understanding of the historical context and making ethical decisions (Khaldi et al., 2023).

Gamification as a pedagogical technology has already proven its effectiveness in increasing the motivation and cognitive activity of university students. Meta-analytic data indicate that gamification in the educational environment is generally associated with an increase in students' intrinsic motivation, as well as with an increased sense of autonomy and connectedness, although its impact on the perception of competence is less clear (Li et al., 2024). At the same time, the effectiveness of gamification is determined not by the mere fact of adding game elements, but by their type: some mechanics more strongly support a sense of competence, while narrative, avatar and team elements are more strongly associated with the experience of social inclusion and semantic involvement (Sailer et al., 2017).

It is important to note that the effectiveness of such approaches depends on the quality of design and technical support, and the “novelty effect” may be

short-term if the teacher does not have sufficient digital competence (Alahmari et al., 2023). A special place among gamified technologies is occupied by the web quest - an interactive structure of independent research activity that integrates digital resources, promotes transformative thinking and solving real pedagogical problems. Web quests effectively implement the principle of “scaffolding”, helping students organize new knowledge and realize the connection between their own activity and educational goals (Zheng et al., 2008). They also stimulate critical thinking through the analysis of conflicting views and the formation of one’s own professional position (Liang & Fung, 2020; Polly & Ausband, 2009). In the context of higher teacher education, webquests remain an undervalued tool, although their conceptual stability has been confirmed even when changing digital platforms (Villegas-Dianta et al., 2025; Li et al., 2023).

Despite the significant interest of the scientific community in gamification, most practical developments and research today focus on primary and secondary schools. In higher education, the integration of complex game models, in particular plot-role-playing webquests with a deep narrative, still remains fragmentary, and their effectiveness requires further study (Yechkalo et al., 2024). At the same time, existing works devoted to the development of quest games in the process of student education mainly concern technical specialties and focus on the general theoretical and practical aspects of creating such products (Dobroskok et al., 2023). In this sense, the webquest “Educational Path. Revolution” expands the existing experience, transferring the quest-based approach to the sphere of psychological and pedagogical training and the content of the history of pedagogy.

Development and testing of the webquest “Educational Path. Revolution” is due to the need to bridge the gap between the voluminous theoretical material on the history of pedagogy and the modern demands of students (future psychologists and educators). Involving higher education applicants in completing a conceptual multiplayer game allows not only to learn factual material in an interactive form, but also to evaluate the mechanisms of action of gamification and pedagogical design on their own experience. This directly forms their professional competence in the use of innovative technologies in future practice. Thus, the study of the design of implementation and the results of testing the author's webquest is a timely and scientifically sound step in the development and modernization of teaching methods in higher education institutions. In Ukraine, especially in the conditions of wartime and the transition to distance/blended learning, the relevance of creating specialized gamified tools for studying the history of pedagogy is growing. Previous studies conducted in the Ukrainian educational context have shown that the forced transition to distance learning is accompanied not only by technical difficulties, but also by a change in the quality of pedagogical interaction, in particular, a decrease in the completeness of feedback, a complication in the perception of students' learning

activity, and the need to find more interactive digital formats of work (Kreydun et al., 2022).

Students of psychological and pedagogical specialties need not only factual knowledge about outstanding teachers, but also decision-making skills in real situations of upbringing and communication. However, there are practically no ready-made multifunctional webquests adapted specifically to these needs. The development and testing of the webquest "Educational Path. Revolution" allows us to fill this gap by combining elements of gamification with the classical content of the "Pedagogy" course.

The scientific novelty of the study lies in the development and description of an author's multi-user webquest for studying pedagogy in higher education, as well as in the primary empirical verification of its educational potential on a sample of future psychologists.

Literature Review

Gamification in higher education is currently classified into two areas: structural (implementation of scores and rankings without changing the content) and content gamification (changing the structure of the material through storytelling and characters). Systematic reviews show that in higher education, gamified learning is mainly associated with improved attitudes towards learning, engagement and performance, although the strength of the effect depends significantly on the course design, subject area and the way in which game elements are integrated (Subhash & Cudney, 2018). Despite the complexity of the latter, structural elements currently dominate higher education practice due to the theoretical shortage of universal approaches (Khaldi et al., 2023). Gamified learning management systems can increase the level of engagement from 62% to 85%, satisfying the needs for autonomy and competence (Barroso-Tristán et al., 2025), but the effectiveness of the approach depends on the skill of the teacher and technical support, since the "novelty effect" can be short-lived (Alahmari et al., 2023). An important place in digital pedagogy is occupied by the webquest technology, the interpretation of which varies depending on the educational goals. It is considered as a pedagogical technology where, through the resolution of cognitive dissonance and the analysis of conflicting views, the student forms his own position (Liang & Fung, 2020). On the other hand, the webquest is defined as an information processing structure that stimulates transformative thinking, that is, the ability to synthesize data from the network to solve real problems (Polly & Ausband, 2009). It is also interpreted as a form of independent research work that integrates digital resources into the task system, which is especially effective for distance learning (Villegas-Dianta et al., 2025).

The role of a webquest in the educational process is also revealed through the concept of "scaffolding" - an instructional framework that helps the student organize new knowledge and understand the connection between his activity and learning goals (Zheng et al., 2008). Developing this idea, it is worth noting that such "scaffolding" takes on some of the functions of the student's volitional regulation. Since the depletion of volitional resources is one of the key triggers

of academic procrastination, delegating these functions to the game system (through a clearly defined logic of moves, prompts and algorithms) significantly reduces cognitive resistance before starting the task. As a holistic methodology, the webquest facilitates autonomous search and helps to master professional terminology (Li et al., 2023). Despite the conceptual stability of this method when changing platforms (Villegas-Dianta et al., 2025), creating a quality product requires significant time investment and a high level of digital competence from the teacher (Li et al., 2023).

The purpose of this study is to describe the implementation design of the multi-user webquest “Educational Path. Revolution” and to conduct an initial pilot evaluation of students’ perceived didactic value, usability, engagement, and limitations of its use in teaching pedagogy.

The specified goal requires solving a number of tasks:

1. To analyze theoretical approaches to the use of gamification and webquests in higher education pedagogy.
2. To describe the narrative, mechanics, interface, technical architecture, and didactic logic of the webquest “Educational Path. Revolution”.
3. To demonstrate how selected webquest tasks are connected with specific pedagogical content, including the history of pedagogy, theory of education, and pedagogical decision-making.
4. To conduct a pilot evaluation of students’ perceived clarity, cognitive interest, subjective understanding, complexity, team interaction, and intention to reuse the webquest.
5. To identify the main limitations of the developed product and outline directions for its further pedagogical and technical improvement.

Methods

Research design. The work was carried out in the format of design-based research, which involves iterative design, implementation and evaluation of an educational product in real conditions of the educational process. The study combined elements of pedagogical design and pilot experiment, which allowed to simultaneously develop the product and verify its effectiveness.

Webquest development. The webquest design process was carried out in several consecutive stages: (1) conceptualization - formation of a didactic concept, definition of learning objectives and basic game rules; (2) distribution of functional roles between project participants (game scenario, visual design, sound design, programming); (3) iterative implementation - parallel development of modules with multiple testing and error correction; (4) integration and final verification of the product. When developing didactic content, the principles of facilitating the educational process and minimizing unnecessary cognitive load were applied.

Participants. The pilot study involved 14 higher education applicants from the School of Psychology of V. N. Karazin Kharkiv National University, studying in the specialty "Psychology" (educational level "Bachelor"). The sample was formed on the principle of availability; the participants were

students from the group that was to take the corresponding topic within the framework of the educational course "Pedagogy".

Data collection tool. To assess students' perceived didactic value and user experience of the webquest, an author-designed questionnaire was developed, which included 7 questions: 6 closed (quantitative) and 1 open (qualitative). Quantitative indicators were measured on a 5-point Likert scale and covered the following constructs: clarity of tasks, cognitive interest, subjective understanding of the educational material, optimality of complexity, effectiveness of team interaction and intention to reuse the product. The open question provided for the collection of qualitative feedback on the experience of interacting with the webquest.

Qualitative responses to the open-ended question were analyzed using a simple inductive thematic approach. First, all responses were read several times to identify recurring meanings. Second, semantically similar comments were grouped into preliminary categories. Third, these categories were summarized into broader themes reflecting students' perceptions of the webquest format, difficulties in team interaction, dominance of competitive mechanics, and suggestions for improvement. Due to the pilot nature of the study and the small number of responses, the qualitative analysis was used for exploratory interpretation rather than for generalization.

Procedure. The testing was carried out within one educational session. After completing the game, students were asked to fill out an online questionnaire. The survey was anonymous and voluntary.

Limitations of the study. The study has a number of limitations that should be taken into account when interpreting the results. First, the pilot nature of the work and the small sample size ($n = 14$), formed on the principle of accessibility, limit the possibility of broad generalization of the conclusions obtained. Second, the testing was carried out within one academic class and in one academic group, which does not allow assessing the long-term effect of using the webquest. Third, the assessment was based mainly on the participants' self-assessment according to the author's questionnaire, which did not undergo separate psychometric validation, and therefore reflects primarily the subjective perception of the experience. In addition, the absence of a control group and the use of predominantly descriptive statistics do not provide grounds for formulating cause-and-effect conclusions regarding the effectiveness of the proposed product.

Since the questionnaire was author-designed and did not undergo separate psychometric validation, the results should be interpreted as indicators of students' subjective perception rather than as objective evidence of learning gains.

Characteristics of the developed webquest “Educational Path. Revolution”

The webquest “Educational Path. Revolution” is an author's multi-user digital educational product developed for studying thematic blocks on the history of pedagogy, theory and methodology of education and pedagogical

communication. The target audience is defined as students of pedagogical and psychological and pedagogical specialties of higher education institutions.

For a more visual presentation of the architecture, interface solutions and types of educational tasks implemented in the webquest “Educational Path. Revolution”, a number of illustrations are presented below, which display the key screens and functional modules of the product.

The initial stage of user interaction with the webquest is implemented through the lobby screen, where the entrance to the game room, character selection and preparation for a joint session are carried out. The visual organization of this interface is shown in Fig. 1.

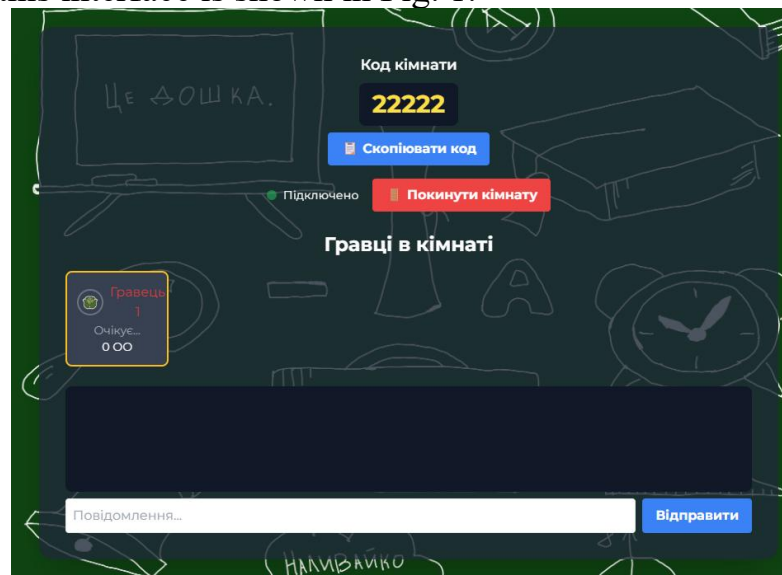


Fig. 1. Main screen (lobby): character selection interface and game room formation/

As can be seen from Fig. 1, the starting interface provides quick user orientation, supports login personalization, and creates the prerequisites for organizing multi-user interaction.

The organizational format involves group work in real time (multiplayer): from 2 to 5 participants in one game room. The estimated duration of one session is 30 minutes or more. To start the game, you need any browser, an Internet connection, and a personal computer; there is currently no mobile version.

Key game mechanics include: (1) moving around the playing field with thematic zones that correspond to specific historical eras in the development of pedagogical thought; (2) test tasks with multiple choice answers; (3) situational cases - pedagogical tasks with a branched scenario in a format similar to visual novels; (4) PvP-type mini-games aimed at developing reaction speed and erudition. The central element of the game navigation is a map organized according to the principle of thematic zones corresponding to individual stages of development of pedagogical thought. The general view of the game field is presented in Fig. 2.



Fig. 2. Main screen of the game map: visualization of the playing field with thematic zones.

Fig. 2 demonstrates that the playing field simultaneously performs navigational, motivational and content functions, visualizing the student's progress through thematic blocks of educational material.

Expected learning outcomes include: consolidating knowledge about prominent representatives of pedagogical science and their concepts; developing pedagogical decision-making skills in simulated situations; training the speed of analytical thinking under competitive pressure.

The condition for victory is to be the first to reach the finish line while simultaneously fulfilling two requirements: overcoming all thematic obstacles and accumulating the required number of education points (the specific threshold is not communicated to players in advance, which stimulates constant activity).

Table 1.

Webquest game mechanics: pedagogical justification and technical implementation

Game mechanics	Pedagogical effect	Technical implementation in the game (webquest)
Web-based stories	Development of empathy and prediction of the consequences of pedagogical decisions	When you hit a special cell, a dialog box with a story opens, where the choice of a line changes the development of the plot
Asynchronous game with bots (AI system) (under development)	The ability to play the game without a group	A game with bots is implemented, where artificial intelligence, a promising function, imitates the moves of real players, creating a competitive environment for one student
Creative quests	Development of creativity and the ability to combine pedagogical concepts	The player must fill in the gaps in a humorous or instructive text with appropriate words or sentences

Game mechanics	Pedagogical effect	Technical implementation in the game (webquest)
Rank and Title System	Ensuring game balance and understanding the impact of social inequality on educational opportunities at different times	Each class has its own conditions. Class change occurs when moving to a new era, which gives everyone a chance to win.
PvP Minigames	Psychological unloading, switching attention, and competitive spirit	Built-in “Lapis-fortifies-papyrus” (rock-paper-scissors) and “Baptize early” (tic-tac-toe) to resolve disputes between players, and the ability to swap places with the defeated player
“God Mode” (Test Mode)	None	Created by the game developer to speed up and facilitate finding bugs in cells
“Reincarnation” Cells	Awareness of historical periodization and the development of pedagogy through different eras	A mandatory cell at the border of eras, symbolizing the passage of time. The player is “reborn” in a new era with a new social class.
Test Zones	Verifying factual knowledge on the history of pedagogy	When you hit a cell, a modal window appears with a question and 4 answer options
“Buff/Debuff” System	Forming a competitive environment, strategic planning and stress resistance	Players can interfere with opponents or help themselves
Multiplayer	Developing social interaction and healthy competition	All players see each other's movements in real time, can interact via chat and shared events on the map
“Eject Player” Button	Self-regulation of the group and ensuring continuity of the educational/game process	Ability to remove a player from the room due to technical problems or destructive behavior to pass the move on
Chat	Developing communication skills, emotional support and discussing strategies	Real-time text communication between all participants in the same game session

Design and technical implementation of a webquest

Game scenario design and UX design

Within the framework of the development of an educational game product, special attention was paid to the design of a narrative architecture that organically integrates game mechanics with didactic goals and does not generate excessive cognitive load. In accordance with the principle of facilitating the learning process, the complexity of game actions was deliberately minimized - in order to avoid distracting the player from meaningful intellectual load. This approach ensures the continuity of the educational track, in which the game shell performs the function of a motivational stimulus, rather than an independent cognitive barrier. Theoretically, this approach corresponds to the modern understanding of game-based learning, within which the educational effect of the game is associated with the coordination of cognitive, motivational, affective

and socio-cultural components with specific educational goals (Plass et al., 2015).

The textual content of the game space (mission names, instructions, notifications) was designed in the paradigm of UX-oriented design: priority was given to maximum brevity and semantic unambiguity of formulations, which ensured quick user orientation in the game environment without additional cognitive costs for decoding the task conditions.

From the point of view of UX design, it is important that a creative task does not visually overload the user and at the same time keeps his attention. This is well illustrated by Fig. 3.

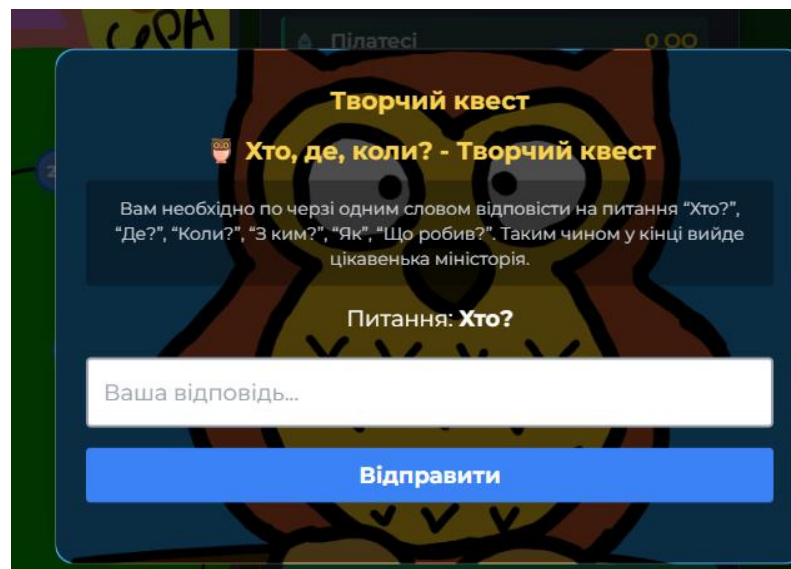


Fig. 3. Modal window of the creative quest "Who? Where? When?"/

As shown in Fig. 3, the modal window of the creative quest combines instructional clarity with elements of game presentation, which enhances engagement without overly complicating the interaction. Along with creative tasks, the webquest integrates test modules to test factual knowledge of the history of pedagogy. An example of the corresponding interface is shown in Fig. 4.

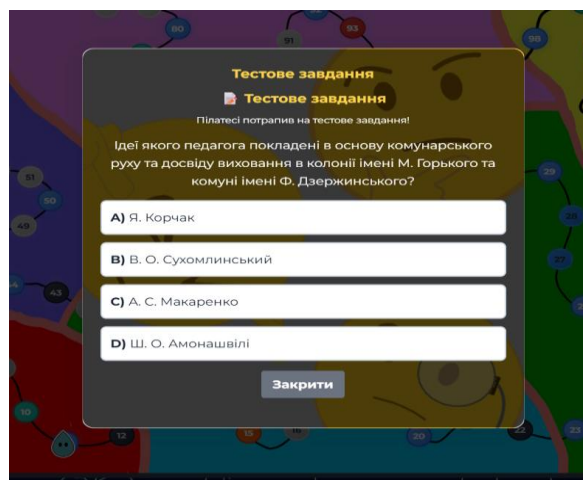


Fig. 4. Modal window of a test task with multiple choice answers

Fig. 4 illustrates that the test component is integrated into the game structure without breaking the overall scenario, due to which the knowledge test is perceived as part of the quest logic, and not as an external control block.

Achieving emotional involvement and stimulating the creative potential of education seekers was implemented through a specific personalization of the communication style. Instead of the traditional academic register characteristic of educational systems, a strategy of "horizontal interaction" was chosen, which involves addressing the user as an equal subject. The integration of elements of irony, friendly humor and a light informal tone into text clouds and dialogues ensured the deconstruction of the formal tension inherent in testing and control situations. From the standpoint of learning psychology, such an approach helps reduce anxiety about making a mistake, forms a safe psychological environment and acts as a catalyst for activating creative thinking. From the standpoint of self-determination theory, supporting autonomy, competence, and connectedness is one of the basic prerequisites for student engagement and quality learning (Niemic & Ryan, 2009).

This strategy directly correlates with neutralizing the deep mechanisms of academic procrastination. Fear of making mistakes and perfectionist attitudes often paralyze students' learning activities. The game architecture of the project rethinks the concept of error: in the context of a webquest, it does not mean real academic failure, but a temporary game "debuff". This allows students to act without excessive psychological resistance, overcoming avoidance behavior.

Visual design

The concept of the visual series of the webquest is based on the principles of stylistic diversity and intertextuality. Specialized software Krita and Adobe Photoshop were used to create illustrative content using a graphics tablet. The author's principled position was to refuse to use generative neural networks, which allowed to preserve the authenticity of the game world and guarantee the uniqueness of each illustration (hand drawing and collage).

The visual strategy involved combining different graphic styles from laconic vector images to detailed raster illustrations in order to create an environment rich in cultural references, which would contribute to emotional relief and increase gaming motivation.

During the development of the playing field, a design risk associated with an excessive number of small details on a monochromatic background was identified. Preliminary analysis showed that such "visual noise" can cause cognitive overload and complicate spatial orientation of players. In this regard, at the final stage, it was decided to switch to a more concise design: a selection of high-quality images from open stock resources that recreate the atmosphere of the corresponding historical era. This allowed optimizing the usability of the interface and reducing the load on the visual perception system.

A separate organizational factor that influenced the development dynamics was the extreme working conditions caused by planned power outages due to shelling of Ukraine's energy infrastructure. Adapting the work schedule

to these restrictions required the team to have a high level of self-organization and advance planning of illustrative stages, which ultimately allowed the project to be completed on time.

Sound design

The integration of sound accompaniment was a methodologically complex aspect of the development, requiring a balance between the motivational function of auditory stimulation and the risk of additional cognitive load. Despite initial expectations regarding the relative simplicity of this task, the process of selecting audio material turned out to be laborious: even with access to large specialized sound databases, questions constantly arose about the relevance of the tracks in the context of the game, their duration and the likelihood of a "saturation effect" with repeated playback.

Given the subjectivity of audio perception, the problem of selecting sounds was solved by collective voting of team members, which allowed them to simulate the focus group procedure and minimize the individual bias of the responsible developer. It is significant that some non-standard sound solutions, in particular, the sound of a metal pipe falling or the system notification from the video game "S.T.A.L.K.E.R." – were originally submitted for voting as a joke, but eventually became part of the final soundtrack. From the perspective of gamification theory, these unpredictable audio stimuli serve as an effective break from the monotony of a long learning process.

The basis of the background music was formed by low-frequency Lo-Fi music of a calm nature. The choice of this genre is justified by the ability of such an audio background to reduce the level of stress and situational anxiety during competitive (PvP) game episodes, providing favorable conditions for concentration during the completion of didactic quest tasks.

Software implementation

The technical development of the webquest required solving a number of architectural problems. The key problem that arose during the evolution of the product from a local version to a full-fledged online multiplayer was state synchronization in a distributed client-server environment. At the initial stages, a problem of desynchronization was recorded, in which the game actions of one player were displayed exclusively on his local device.

To eliminate this drawback, the system architecture was transferred to a client-server model using Node.js and Socket.io. The logic of the server.js and multiplayer.js files was rewritten according to the following principle: the client sends a request to perform an action – the server validates the request, updates the global state of the game, and simultaneously broadcasts the current data to all participants in the game room. Special attention was required for the validation of player identifiers and the management of the turn queue. The asynchronous nature of JavaScript generated logical collisions, in which the server granted permission for the action before the queue check was completed, which led to double-turn errors or blocking of modal windows while waiting for server confirmation. The solution was to introduce a strict chain of events: validation of the player identifier relative to the current queue index → only after

a successful check – rendering of the modal window or changing the position on the client side.

The complexity of implementing the PvP interaction mechanics was the need to organize a parallel game space for two duelists, while the other players are in wait mode. This required the creation of separate event spaces to correctly transfer the results of the duel back to the main game loop. In parallel, the development of a system of local bots was started, the main task of which is to simulate human reactions and delays, which provides the feeling of a real game session in single mode.

In order to optimize the development processes, a systematic approach to the toolkit was applied. In particular, instead of manually determining the X and Y coordinates for placing 102 game cells on a non-standard map, an auxiliary script was written that provided instant receipt of accurate coordinates by clicking the cursor on the visual map. Based on the experience of technical implementation, a key recommendation for future developers of educational games was formulated: the project architecture should be built according to the “Server-First” principle from the first day of work. This involves: (a) setting up the multiplayer environment and server checks at the initial stage; (b) abandoning the static single-page format in favor of a full-fledged web application with routing between screens (or a modern framework with session state preservation); (c) introducing a strict hierarchy of folders and files from the first day of development, which minimizes the time spent on refactoring at the final stages.

Scenario for integrating a webquest into the educational process

Below is a recommended scenario for conducting a training session using the webquest "Educational Path. Revolution" (Table 2).

Table 2.

Structure of a training session using a webquest

Stage of the lesson	Teacher actions	Student actions	Expected result
Preparatory stage (5-10 min.)	Formulates the goal, explains the rules and tasks of the game. Opens the room and provides instructions for entry.	They connect, choose a nickname and avatar (chip), get acquainted with the rules and tasks.	Reducing tension, forming psychological readiness for the lesson, mobilizing attention.
Main part (30-40 min.)	Assists with technical issues, moderates group dynamics, stimulates game motivation, facilitates in areas of conflict interaction.	They perform tasks (make decisions, undergo testing), interact in the chat, react to events, make moves.	Internalization of the material, emotional involvement.
Post-game discussion (10-20 min.)	Asks questions, draws parallels	They answer questions, analyze the	Transferring skills acquired during the

Stage of the lesson	Teacher actions	Student actions	Expected result
	between tasks and educational material.	learned material, analyze the consequences of the chosen strategies.	game to the educational plane.
Summarization (5-10 min.)	Systematizes the results, coordinates the discussion of proposals for improving educational content.	They offer options for improving and transforming the format. They evaluate their own performance.	Development of educational content and professional self-awareness.

The proposed scenario for using a webquest in the educational process corresponds to approaches to organizing digital project activities, in which a clear phasing, systematic communication, consulting support, and correction of results in the process of work play a key role (Nalyvaiko, 2021).

The didactic potential of a webquest can be further enhanced through structured debriefing, since it is the collective discussion of the gaming experience after completing tasks that contributes to increased motivation, self-assessment of educational effectiveness, and better transfer of gaming experience to the academic plane (Bilgin et al., 2015).

Connection Between Webquest Tasks and Pedagogical Content

Each game mechanic in the webquest is purposefully linked to specific content from the courses on the history of pedagogy, theory of education, and pedagogical communication. Table 3 below illustrates how individual tasks correspond to particular disciplinary topics and the learning outcomes they target.

Webquest task	Pedagogical content	Learning outcome
Test zone on classical pedagogy	Knowledge of key representatives of pedagogical thought and their concepts	Students identify the author, concept, historical period, and basic idea
Situational case in pedagogical communication	Theory of education, teacher-student interaction, ethical decision-making	Students analyze the consequences of pedagogical choices
Reincarnation / historical era transition	Periodization of the history of pedagogy	Students connect pedagogical ideas with sociocultural context
Creative quest	Application of pedagogical terminology	Students use concepts actively rather than merely recognize them

To illustrate how these connections are implemented in practice, consider the following examples of specific in-game tasks:

Example 1. A test task asks students to identify the educator associated with a particular concept of moral or social education. This task supports factual recognition and historical orientation within the content of the history of pedagogy.

Example 2. A situational case presents a classroom conflict and asks students to choose a pedagogically appropriate response from several options. This task directly connects the theory of education with decision-making in the context of pedagogical communication.

Example 3. A "reincarnation" cell transfers the player to another historical period, requiring them to interpret pedagogical ideas in relation to the social and cultural conditions of that era, thus reinforcing knowledge of the periodization of pedagogical thought.

This alignment ensures that engagement with game mechanics simultaneously engages students with substantive disciplinary content, rather than treating gameplay and learning as separate activities.

Results of the pilot study. To conduct a pilot evaluation of students' perceptions of the webquest "Educational Path. Revolution", a pilot empirical study was conducted with the participation of 14 higher education applicants. The assessment was carried out using the author's questionnaire, which included 6 quantitative indicators (on a 5-point Likert scale) and an open question for qualitative analysis of subjective responses (tabl. 4).

Table 4.

Results of the pilot study:
average values for quantitative indicators (n = 14)

Indicator	Average score (M)
Clarity of tasks	4,6
Cognitive interest	4,6
Understanding the topic (pedagogy)	4,4
Optimal complexity	4,1
Effectiveness of team interaction	3,0
Desire for reuse	4,7

Quantitative data analysis. The maximum indicator was recorded on the scale of intention to reuse the product (M = 4.7) and cognitive interest (M = 4.6), which indicates a high level of gamification involvement and the subjective value of the experience gained. Indicators of task clarity (M = 4.6) and subjective understanding of the material (M = 4.4) confirm the didactic effectiveness of the chosen approach. The indicator of optimal complexity (M = 4.1) indicates a generally balanced level of cognitive load.

The lowest indicator was the efficiency of team interaction (M = 3.0), which is statistically different from the rest of the parameters and indicates the presence of technical or communication barriers within the game chat.

Qualitative analysis of open-ended responses revealed the following recurrent themes: positive assessment of the non-standard format of presenting educational material; concerns about the dominance of the competitive element

over the didactic content ("stimulates clicking through the text faster"); as well as proposals for the introduction of interactive pedagogical characters (a bot in the image of Makarenko, Rousseau, etc.). Some students noted that "the competitive element made us focus more on speed than discussion," while others mentioned that "it was not always clear how to cooperate with teammates during the game."

Discussion

The results obtained allow for a systematic comparative analysis of the webquest "Educational Path. Revolution" with existing gamified tools, as well as to highlight the psychological and pedagogical mechanisms of the identified effects.

Unlike widely used rapid testing platforms (Kahoot!, Quizizz), which are based mainly on structural gamification (ratings, points), "Educational Path. Revolution" implements deep gamification of content through storytelling and situational cases. Similar to Kahoot!, the studied webquest generates a sense of competitive excitement, however, as recorded in qualitative reviews, this effect may dominate the reflective component ("stimulates clicking through the text faster"). This observation is consistent with the data of the longitudinal study by Hanus and Fox (2015), in which a course with pronounced ranking and reward mechanics was associated with a decrease in intrinsic motivation, satisfaction and final results compared to a non-gamified format. This emphasizes that competitive elements require particularly careful pedagogical adjustment. This confirms the theoretically justified risk of the prevalence of gaming motivation over didactic motivation (Alahmari et al., 2023). At the same time, the system of ranks and social classes ("Reincarnation") is a functional analogue of the mechanics of Classcraft, where class characteristics determine the conditions of competition. Such an architecture implements the principle of dynamic balance, which is rarely present in highly specialized educational quests. The mechanics of moving around the playing field, borrowed from the board game genre (cf. "Monopoly"), provide clarity of game progress; however, as in classic board game analogues, the high proportion of randomization in PvP minigames can be perceived ambiguously ("depends on random").

The analysis of quantitative and qualitative data allows us to interpret the results obtained through the prism of two theoretical constructs: the "novelty effect" and the concept of scaffolding. The use of non-standard auditory stimuli (for example, the sound of a metal pipe falling) and meme elements contributed to maintaining attention for 30 minutes or more, however, qualitative analysis revealed that the game chat did not transform into a platform for subject-specific professional communication. This is consistent with the predicted "novelty effect" found in relevant studies (Alahmari et al., 2023), and indicates the need to move from a competitive to a cooperative model of interaction, where achieving victory will require mandatory team synergy. The results also correlate with data from university studies, which show that the balance between cooperative and competitive mechanics is critically important for the quality of

student interaction and the depth of their intellectual engagement (Sánchez-Martín et al., 2017).

The relatively low score for team interaction should not be interpreted as a failure of the webquest as a whole. Rather, it indicates a mismatch between the multiplayer format and the actual cooperative structure of the tasks. Although students participated in the same game room, the mechanics often stimulated parallel individual competition rather than interdependent cooperation. This explains why future versions of the webquest should include tasks that cannot be completed without joint decision-making, role distribution, and shared responsibility for the final result. For this reason, the next iteration of the webquest should include cooperative missions, shared group scores, role-based tasks, and debriefing questions requiring students to connect game decisions with pedagogical theories.

The proposal of the study participants to introduce “pedagogical bots” (in the image of Makarenko, Rousseau, etc.) is theoretically promising. The implementation of such a module would overcome the problem of asynchronous passage and develop the concept of scaffolding: the function of organizing knowledge would be performed not by an algorithm of random events, but by interaction with virtual carriers of specific pedagogical paradigms. This would be consistent with theoretical propositions about scaffolding as an instrumental framework that organizes the process of acquiring new knowledge (Zheng et al., 2008).

Research and Webquest Limitations

The identified limitations are divided into two categories: corrective (those that can be eliminated in subsequent development iterations) and fundamental (which are inherent characteristics of the chosen concept).

User interface (UI) adaptability. The current version of the interface is not optimized for different screen resolutions; if the sizes do not match, users are forced to manually adjust the page scale. In addition, some errors in positioning elements and loading images in modal windows were recorded. These problems are correctable within the next development cycle.

Server infrastructure instability. Cloud deployment on the Render platform is accompanied by initialization delays: when the link is first loaded, the server's "cold start" can last up to 30 seconds, during which players observe a blank screen. This reduces the first user interaction and requires a technical solution (for example, switching to a platform with hot backup).

Time resource limitations. The minimum duration of a game session (30 minutes) takes up a significant part of a seminar or practical lesson and can make it difficult to conduct a reflective debriefing within one academic pair. A separate challenge is the requirement for stable attention: for students with reduced volitional regulation and a tendency to procrastination, a long game format can lead to cognitive exhaustion.

Randomization versus scaffolding. The algorithm for randomly generating game events violates the principle of sequential complication of the

material. Instead of structured accumulation of knowledge, the player may encounter a chaotic alternation of topics, which potentially increases cognitive load. At the same time, the high proportion of randomization of movements is partially compensated by a system of buffs/debuffs: players learn not to rely on circumstances, but to develop strategies for minimizing risks, which contributes to the formation of a proactive attitude to educational activities.

The dominance of the entertainment component. The presence of memetic audio stimuli and PvP mini-games in the “rock-paper-scissors” format provides psychological relief but carries the risk of distraction from the didactic content. There is a possibility that some students will focus mainly on the competitive aspect, ignoring the material from the history of pedagogy. This risk corresponds to the theoretically described “novelty effect” and requires methodological correction of the teacher’s role as a facilitator of reflection.

Architectural limitation: lack of session state preservation. The game is implemented as a single-page application (SPA) with switching between DOM blocks. Random page refresh resets the player’s local state, and using localStorage does not solve the problem, since the server session is interrupted. The result is a “stuck” of the turn queue and de facto completion of the game for all room participants. Solving this problem requires the implementation of a server-based persistent state storage and a reconnection mechanism.

Lack of a mobile version. The game interface and map are designed for horizontal orientation and large monitors. Adapting a large array of interactive elements to vertical screens of mobile devices requires a complete redesign of the UI/UX, and therefore, a mobile version was deliberately abandoned. This significantly limits the accessibility of the product for students who mainly work from smartphones.

Conclusions

The pilot evaluation indicates that the webquest was positively perceived by students and may serve as a promising gamified tool for supporting engagement and subject-related interaction in pedagogy courses. The integration of complex game mechanics into the process of studying the history of pedagogy allowed transforming traditional theoretical material into an interactive educational environment that meets the current needs and expectations of modern education seekers.

Based on the analysis of the research results, the following key conclusions were formulated:

1. Psychological safety and overcoming procrastination. Thanks to the scaffolding system, delegation of volitional regulation functions to the game system, and informal communication style, the webquest successfully reduces cognitive resistance and fear of error. Academic failure is reinterpreted as a temporary game "debuff", which stimulates proactive learning behavior and minimizes manifestations of academic procrastination.

2. High subjective value of experience. The results of the pilot study (n = 14) demonstrated high levels of cognitive interest (M = 4.6) and intention to reuse the product (M = 4.7). Non-standard stimuli, an author's visual style

(without the use of generative artificial intelligence) and a specific sound design effectively switch attention and prevent monotony of the learning process.

3. Development vector: from a competitive to a cooperative model. The relatively low score of team interaction effectiveness ($M = 3.0$) and a qualitative analysis of game behavior indicate that the existing PvP mechanics and competitiveness can dominate the didactic content and hinder the development of professional communication. This determines the priority vector of further development - the transition to a cooperative model, where achieving victory will require mandatory team synergy.

4. Formation of an internal locus of control. Despite the objective challenges (session duration of more than 30 minutes and a significant proportion of randomization of movements), the game architecture stimulates students to strategic planning and decision-making under conditions of uncertainty. The buff/debuff system provides a mechanism for compensating for random events, teaching players to develop adaptive strategies, which contributes to the formation of an internal locus of control in educational activities.

Therefore, the webquest should be considered a promising gamified educational tool with didactic potential, while its objective impact on learning outcomes requires further research using larger samples, pre-test/post-test procedures, validated instruments, and comparison groups.

Conflict of interest statement. The authors confirm that they have no actual or potential conflict of interest that could influence the results of the study or their interpretation.

AI statement. During the preparation of this manuscript, artificial intelligence tools were used solely for language support, including stylistic refinement, grammar correction, and improvement of phrasing clarity. AI was not used to generate the core scientific ideas, research design, data, analysis, or conclusions of the study. The authors retained full responsibility for the content of the manuscript, the accuracy of interpretations, and the final version of the text.

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Вебквест «Освітній шлях. Революція» як інструмент ефективного навчання з педагогіки: дизайн впровадження

Анотація. У статті представлено результати розроблення та пілотної апробації авторського багатокористувацького вебквесту «Освітній шлях. Революція», призначеного для вивчення історії педагогіки, теорії та методики виховання, а також педагогічного спілкування у закладах вищої освіти. Актуальність дослідження зумовлена зростанням ролі цифрових та гейміфікованих форм навчання у вищій школі, особливо в умовах змішаного й дистанційного освітнього процесу. Метою роботи є опис дизайну впровадження вебквесту та первинна верифікація його дидактичної ефективності. Дослідження виконано у форматі design-

based research, що поєднало етапи концептуалізації, ітеративного проектування, технічної реалізації та апробації продукту в реальних умовах навчального заняття. У пілотному дослідженні взяли участь 14 здобувачів вищої освіти факультету психології Харківського національного університету імені В.Н. Каразіна. Для оцінювання було використано авторську анкету з 6 кількісними показниками та відкритим запитанням. Результати засвідчили високі показники пізнавального інтересу ($M=4,64$), зрозумілості завдань ($M=4,57$) та наміру повторного використання продукту ($M=4,71$). Найнижчий показник стосувався ефективності командної взаємодії ($M = 3,00$), що вказує на потребу подальшого розвитку кооперативних механік. Практичне значення дослідження полягає в обґрунтуванні можливостей використання вебквесту як інтерактивного цифрового інструменту для підвищення залученості студентів, активізації пізнавальної діяльності та урізноманітнення методів викладання педагогічних дисциплін. Зроблено висновок про концептуальну спроможність вебквесту як інструменту підвищення залученості, підтримки навчальної мотивації та осмисленого засвоєння педагогічного матеріалу.

Ключові слова: гейміфікація, вебквест, вища освіта, педагогіка, дизайн-дослідження, цифрове навчання

Стаття надійшла до редакції: 10.04.2026.

Прийнята до друку: 18.06.2026.

Опублікована: 30.06.2026.

DOI: <https://doi.org/10.28925/2312-5829/2026.1.12>

УДК 37.091.33:82-1]:159.955

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Мультимодальна поезія як інструмент розвитку критичного мислення учнів

Анотація. У сучасному освітньому середовищі поезія перестає бути виключно текстовим явищем і дедалі активніше інтегрується у цифровий простір, де вона набуває нових форм і функцій. Ліричні твори сьогодні звучать у форматі аудіопоезії, оживають у відеоінтерпретаціях, поєднуються з графічними елементами, стають частиною інтерактивних платформ та соціальних мереж. Така мультимодальна поезія відкриває нові можливості для вивчення