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EDİTÖRLER;
Prof. Dr. Emine KOCA
Prof. Dr. Fatma KOÇ

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EDİTORLER

Prof. Dr. Emine KOCA

Prof. Dr. Fatma KOÇ

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METHODOLOGY FOR ORGANIZING TEAM INTERACTION AND DEVELOPING SOFT SKILLS IN A VIRTUAL EDUCATIONAL ENVIRONMENT

PhD in Technical Sciences, Associate Professor Stanislav DUSHKIN
Kharkiv National Automobile and Highway University, Faculty of Road Construction, Department of Ecology, 61002, 25 Yaroslava Mudroho Str., Kharkiv, Ukraine
ORCID ID: 0000-0002-9345-9632
PhD in Technical Sciences, Associate Professor Halyna BLAHODARNA
O.M. Beketov National University of Urban Economy in Kharkiv,
Department of Water Supply, Sewage and Treatment Engineering
Department of Water and Wastewater Engineering,
61002, 17 Chornoglazivska Str., Kharkiv, Ukraine
ORCID-ID: 0000-0002-1187-4737

ABSTRACT

This paper examines the transformation of higher education through the integration of interactive digital tools and structured team collaboration in virtual learning environments. Given the prolonged, enforced use of distance learning, traditional online classes often face reduced student engagement, a decline in motivation and the psychological phenomenon of screen fatigue. To address these systemic issues, the study proposes a comprehensive pedagogical methodology that combines the principles of microlearning with collaborative problem-solving tasks, specifically adapted to the structure of a standard academic session.

The technical framework of the study relies on the synergy between the Moodle learning management system and the BigBlueButton video conferencing module. By utilising built-in features such as Breakout Rooms for small-group work, multi-user whiteboards for graphical visualisation and shared notes for collaborative document creation, the proposed approach overcomes the difficulties associated with third-party platforms and the single sign-on (SSO) barrier. Furthermore, the methodology assigns students clear functional roles within groups – moderator, secretary, analyst and speaker – which ensures structured teamwork, active participation and the development of essential soft skills.

An evaluation of the methodology shows that dividing the educational process into clearly defined micro-phases within an academic session successfully maintains students' attention, reduces cognitive load and transforms passive listeners into active participants. Quantitative and qualitative analysis of session logs demonstrates the high effectiveness of time management, structured data entry and collaborative content editing. Despite the technical limitations identified, such as internet stability and periodic imbalances in group activity, the hybrid structure has proven highly effective in developing analytical thinking and practical problem-solving skills.

Keywords: Higher education, virtual learning environment, microlearning, collaborative teamwork, digital pedagogical tools.

1. INTRODUCTION

Many years of experience with the enforced use of distance and blended learning formats in higher education have revealed a number of persistent problems, the main one being a decline in students' motivation and engagement. Symptoms of 'screen fatigue' and a lack of direct emotional interaction with the lecturer lead to the learning process becoming overly formalised and a reduction in the effectiveness of academic sessions. In this regard, a key task for lecturers is to implement comprehensive teaching approaches that combine the principles of micro-learning and interactive team-based collaboration. Replacing traditional online lectures with structured micro-sessions within an academic session helps to reduce cognitive load, sustain cognitive interest and transform passive listening into active group work (Chen et al., 2025; Hlazunova et al., 2024).

Despite the existence of a significant body of work on the digitalisation of higher education, the issue of adapting active teaching methods to the specific nature of classes conducted in a virtual environment remains under-researched. Contemporary researchers emphasise that the integration of interactive scenarios into an online format requires a detailed scientific rationale and the development of clear algorithms for team interaction (Bygstad et al., 2022; Zamiri and Esmaeili, 2024).

The aim of this study is to provide a scientific and methodological basis for, and to develop practical approaches to, the organisation of an interactive learning process in a distance-learning context, with a view to enhancing cognitive engagement and fostering professional competences among higher education students.

2. MATERIAL AND METHODS

To achieve the set objective and implement an interactive format within the context of distance learning, a comprehensive methodology was developed, based on the synergy between the principles of micro-learning and team collaboration. The experimental part of the study was based on adapting traditional classroom scenarios to the strict time constraints of an academic session.

The methodological approach is based on dividing the educational process into sequential phases, which ensures the continuity of the management and cognitive cycles without compromising academic depth (Hlazunova et al., 2024).

The technical implementation of the methodology relies on the capabilities of the university's virtual learning environment and integrated video conferencing systems. The Moodle learning management system and the BigBlueButton (BBB) module were utilised as the primary software tools, enabling effective management of group dynamics in the online environment.

To ensure structured work by participants, specialised digital features were utilised, such as breakout rooms for distributed work, interactive multi-user whiteboards for visualising solutions, and shared notes for the collaborative preparation of final documents.

The process of conducting an interactive session was structured into time-bound phases with a strict timetable. Each phase is designed to address a specific teaching objective: from initial immersion in the problem to the presentation and defence of the final product. The diagram illustrating the interaction between the components of the educational environment represents a sequential algorithm for delivering sessions in a virtual space. In the first stage, an initial analysis of the data is carried out and learners are introduced to the introductory case study in the Moodle LMS. Participants are then automatically assigned to breakout rooms via the BigBlueButton video conferencing module and divided into target groups. The interactive modelling stage involves the use of a multi-user whiteboard to construct structural and logical diagrams and visualise solutions. This is followed by the consolidation and preparation of solutions through the collaborative editing of final theses in Shared Notes and the creation of a unified project. The final stage involves the presentation and verification of results through the defence of projects in a joint session and the uploading of the final report to the Moodle system (Bygstad et al., 2022).

To carry out comprehensive monitoring of student engagement, a systematic list of criteria and indicators was drawn up, covering the main pedagogical aspects (Table 1)

Table 1. Criteria and digital tools for assessing learner engagement

Engagement criterion	Indicators of engagement	Digital tool used
Behavioural	Speed of logging in, attendance in session rooms, timeliness in completing micro-tasks.	LMS activity log, BBB visit logs.
Cognitive	The depth of analysis of the input data, the logic behind the diagrams, and the soundness of the proposed solutions.	Interactive whiteboard (Whiteboard), editable notes (Shared Notes).

Emotional and social	The intensity of communication within the group, the distribution of roles, mutual support.	Breakout Rooms chat, results of group defence.

The set of indicators and tools presented here enables the continuous monitoring and qualitative assessment of the effectiveness of teaching activities at every stage of a lesson, facilitating feedback between the lecturer and students within a virtual learning environment.

3. RESULTS AND DISCUSSION

3.1: Forming groups and assigning roles

An analysis of the implementation of the proposed methodology in a virtual classroom revealed the specific features of organising team collaboration within the strict framework of a remote lesson. The first stage of the practical work involved forming small groups. Using the Breakout Rooms feature in the video conferencing system, the lecturer divided the participants into sub-groups of 3–5 people. This division ensures that every student is equally involved in the discussion and minimises the risk of passive observation, which is characteristic of traditional online lectures.

Within the small groups formed, the working process was structured around the allocation of functional roles amongst the students. Whilst the overall distribution of participants is regulated by the lecturer when creating the breakout rooms, the allocation of specific tasks within each small group was carried out by the students themselves, based on their current interests and skills. During the sessions, the following main roles were identified:

– Moderator – coordinates the sub-group's overall work, ensures that the time limits for each stage of the task are adhered to, and keeps the discussion on track with the task at hand;

– Secretary – is responsible for recording key ideas on the multi-user whiteboard and adding agreed points to the shared notes;

– Analyst – carries out the initial processing of the case study's input data, compares it with the course's theoretical material and checks the logic of the arguments supporting the proposed measures;

– Speaker – presents and defends the group's consolidated solution during the final plenary session.

To organise the allocation of tasks and the digital tools used within the small groups, the following table was drawn up (Table 2):

Table 2. Distribution of roles and functional use of digital tools in session rooms.

Role within the group	Main responsibilities	Digital tool used
Moderator	Co-ordinating the team's work and monitoring the timing of each stage.	Video and audio links in the breakout rooms.
Secretary	Visualising diagrams, making amendments to the final text document.	Multi-user Whiteboard, Shared Notes.
Analyst	Processing raw data, checking the logical consistency of decisions.	Electronic course materials (Moodle repository).
Speaker	Presentation of the prepared project at the general virtual session.	General video conference session (BigBlueButton).

3.2: Analysis of the use of digital tools

An analysis of session logs and the results displayed on the virtual whiteboard revealed the following quantitative and qualitative indicators of tool usage:

– Transition and set-up time for group work: Allocating students to breakout rooms took an average of 45–60 seconds, which minimised unproductive time lost during the session;

– Frequency of data entry on the multi-user whiteboard: On average, each group recorded between 6 and 10 structured blocks on the interactive whiteboard during 40 minutes of teamwork, including links between risk factors and proposed measures;

– Trends in editing Shared Notes: Analysis of edits to the shared text notes showed that groups spent around 80 per cent of their time on substantive discussion of the text and only 20 per cent on the technical formatting of the final document.

The use of built-in modules (Breakout Rooms, Whiteboard, Shared Notes) meant there was no need to rely on third-party external platforms, which eliminated the 'single sign-on' (SSO) issue and reduced the number of distractions for students whilst working in the virtual environment.

3.3: Discussion of the results and pedagogical effects

The findings indicate that integrating micro-learning and team collaboration within an academic pair enables the limitations of the distance learning format to be effectively overcome. A comparison of the data with the findings of other researchers (Hlazunova et al., 2024; Dell'Aquila et al., 2017; Krouska et al., 2022; Sailer and Homner, 2020) confirms that structuring the learning process into short time intervals helps to reduce cognitive load and maintain learners' attention.

At the same time, certain technical and organisational limitations were identified during the pilot study:

– Dependence on connection stability: Participants with a weak internet signal experienced difficulties when working synchronously with the Multi-user Whiteboard;

– Uneven activity levels: In some groups, dominant participants took the lead when roles were allocated at the initial stage, which required additional moderation by the teacher.

Thus, the proposed approach demonstrates high practical applicability for developing analytical skills and teamwork, but requires prior preparation and consideration of the technical capabilities of the virtual environment.

4. CONCLUSIONS

This paper scientifically substantiates and validates a methodology for organising interactive team collaboration within a virtual learning environment, enabling the successful integration of complex learning scenarios into the strict timeframe of a single distance-learning academic session. Based on a systematic analysis of digital tools, it has been demonstrated that the synergy between the capabilities of the Moodle platform and the BigBlueButton module ensures the continuity of the management and learning cycles – from the analysis of source data to the development of group projects and reports.

The designated functional roles (moderator, secretary, analyst, speaker), combined with the tools of session rooms, multi-user whiteboards and collaborative notes, help to enhance students' cognitive engagement and develop practical teamwork skills. Prospects for further research include adapting the proposed approach for other educational platforms and assessing its impact on students' long-term academic outcomes.

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Contact;
www.isarcacademy.com/2026
info@isarcacademy.com