Efficiency of using communication tools on the Moodle platform to increase student engagement in a war environment

Olena Verzhihovska[1], Maryna Lysyniuk[2], Oksana Voznyuk[3], Tetiana Korzhova[4], Marina Barbash[5]

Kamianets-Podilskyi National Ivan Ohiienko University, Kyiv National University of Culture and Arts, Hetman Petro Sahaidachnyi National Army Academy, Chernihiv Polytechnic National University

Abstract

The main objective is to identify the key means that influence interaction in online learning and to provide specific recommendations for optimizing these processes in a war environment. The research methodology included a combination of qualitative and quantitative methods. The work sample included 120 teachers and 56 students from Ukrainian universities. Using surveys and analysis of Moodle's built-in analytics features, the study looked at the frequency of use of various communication tools in the war conditions. The results confirm that forums and a system of messages, chats, announcements, and blogs are the most effective means of communication for teachers and students. Engagement scores on the Moodle platform were average, indicating the importance of the platform. The dynamics of changes showed important stages in the use of communication tools during the study period. Conclusions: the study confirms the importance of communication tools for creating an effective educational environment on the Moodle platform. Recommendations for further improvement include optimizing the forums and developing the message system. The obtained results can serve as a basis for improving the quality of online education and contribute to the further development of modern methods of education in the conditions of distance learning.

Keywords

Communication tools, electronic platform, increasing the level of interaction, survey, digitalization.

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[1] Department of Psycho-Medical-Pedagogical Foundations of Correctional Work, Kamianets-Podilskyi National Ivan Ohiienko University, Kamianets-Podilskyi, Ukraine, 71lentochka@gmail.com

[2] Department of Public Relations and Journalism, Faculty of PR, Journalism and Information Policy, Kyiv National University of Culture and Arts, Kyiv, Ukraine, marina_lysynuk@ukr.net

[3] Department of Military History, Faculty of Combat Arms, Hetman Petro Sahaidachnyi National Army Academy, Lviv, Ukraine, oksa_w2000@ukr.net

[4] Department of Public Relations and Journalism, Faculty of PR, Journalism, and Information Policy, Kyiv National University of Culture and Arts, Kyiv, Ukraine, ua.kiev.tania@gmail.com

[5] Department of Architecture and Environmental Design, Educational and Scientific Institute of Architecture, Chernihiv Polytechnic National University, Chernihiv, Ukraine, m_barbash@ukr.net

Introduction

In the context of the Russian-Ukrainian war, researching the efficiency of using communication tools on the Moodle platform to increase student engagement becomes particularly significant. Due to the unpredictability and challenges accompanying military conflicts, it is crucial to turn to innovative educational methods to provide students with the opportunity to learn and interact in conditions of instability. In this context, investigating the possibilities of utilizing communication tools on the Moodle platform can identify optimal strategies for engaging students in the learning process and creating a conducive environment for knowledge exchange, even in the midst of military tension.

Online education has witnessed a significant increase in popularity and adoption, especially in the context of global advances in technology and the changing landscape of higher education (Peni & Dewi, 2023; Strashko, 2022; Manan et al., 2020). Learning Management Systems (LMS) plays a key role in facilitating online learning by providing a virtual space for teachers and students to engage in a variety of learning activities. One such widely used LMS is Moodle, known for its versatility and features that support collaborative and interactive learning environments (Di Cerbo et al., 2008; Guirette-Barbosa et al., 2023; Salkhlailah, 2016).

This platform is actively used by teachers and students in Ukraine in the conditions of the Russian-Ukrainian confrontation. It has become one of the most popular platforms that contains a variety of communication tools. This study focuses on understanding the effectiveness of communication tools on the Moodle platform and their impact on increasing learner engagement and interaction in a war environment.

In addition, the rationale for this study stems from the evolution of education, where teachers and students are constantly exploring innovative ways to adapt to the challenges of online learning. (Tsekhmister et al., 2023). Recognizing the importance of a long-term approach, this study spans six months, allowing for a comprehensive analysis of the lasting impact of Moodle's communication tools. Involving 120 faculty members and 56 students from Ukrainian universities, the study seeks to understand the nuanced dynamics of online communication in higher education and contribute valuable knowledge that can inform the continuous improvement of online teaching practices. As the digital sphere continues to change education, this study aims to contribute to the ongoing dialogue on optimizing communication tools in Moodle, ultimately enriching the online learning experience for both teachers and students.

Hence, this study focuses on analyzing and evaluating the effectiveness of various communication tools in the Moodle system, determining their impact on student engagement and ability to promote active interaction. The results of this study may open up new opportunities to optimize the learning process and improve the quality of education in a digital format. By highlighting the importance of electronic technologies in facilitating individualized education for students with special needs, Iskakova (2023) study provides a foundation for future efforts to enhance individualized learning experiences. This underscores the broader relevance of technological solutions in overcoming educational barriers, whether due to special educational needs or the disruptive impacts of conflict.

Therefore, the purpose of the article is to provide a comprehensive analysis of the main means of communication in the Moodle system, which defines the following research questions:

1. What communication tools do you use in the Moodle system?

2. How do you assess the effectiveness of the messaging system for personal consultations and information exchange with teachers or students in the conditions of war?

3. How do you assess the level of student engagement on Moodle in the conditions of war?

4. What communication tools do you consider to be the most effective for increasing interaction between participants in the Moodle learning process? (Select one or more options)

5. What improvements would you suggest to increase engagement and interaction on Moodle?

6. In general, how would you rate the effectiveness of using the communication tools on the Moodle platform for your learning needs?

7. What advice would you give to optimise the use of communication tools on Moodle to improve the quality of education in the conditions of war?

Thus, this article tries to focus on such goals, determination of the frequency of use of the platform, characteristics of fixed assets of communication, determining the effectiveness of the Moodle communication tool for increasing the involvement of students. Based on the survey, this article attempts to fill the gaps regarding the effectiveness of using an electronic platform for training in war zones.

1. Literature Review

Modern researchers generally emphasize the importance and effectiveness of digital technologies. Current innovative approaches to the use of virtual platforms are described in Khorolskyi (2023). Sherman et al (2022) described the role of digitalization for the future development of Ukrainian education. The researchers noted that this trend will continue to be present in the Ukrainian education system. This problem is partially addressed in the studies by Iskakova et al. (2023) and Krymets (2022). Key aspects of distance education are described in detail in Sanetra-Półgrabi (2023). Ostanina et al. (2023) describe the importance of digital competence for modern learners. The researchers also described in detail the main conditions for its formation. Akimov et al. (2023) described the main components of Education 4.0 based on a systematic literature review. Nazarenko, Honcharova, and Sipii (2022) described the conditions for the introduction of STEM education in Ukraine. The main innovative educational trends are identified in Saienko et al. (2023). Varianytsia et al. (2023) describe the advantages and disadvantages of using the Google Classroom cloud learning environment. The effectiveness of blended learning was studied by Tsekhmister (2023). At the same time, Tsekhmister et al (2022) describe the problem of the effectiveness of online education. Also, Tsekhmister, Konovalova, and Tsekhmister (2021) described the peculiarities of using distance education in Ukraine. All these works form the theoretical and methodological basis of the article.

Lebedynska (2023) exploration of the evolving landscape of modern warfare strategies, driven by technological progress, provides a relevant backdrop for understanding the importance of maintaining educational engagement through communication tools during conflict periods. The study's focus on cyberwar and hybrid war sheds light on the broader context in which the use of Moodle's communication tools operates - specifically, a world where technology significantly affects both conflict dynamics and the continuity of education.

The findings from Sofilkanych et al. (2023) regarding the need for adaptive algorithms and security measures in the medical use of AI provide a valuable perspective on the importance of safeguarding personal information and ensuring ethical considerations in the deployment of technologies. This is analogous to the educational research's recommendations for optimizing forums and developing messaging systems on the Moodle platform, where considerations for user privacy and the quality of interaction

are paramount. Thus, modern researchers have been interested in various research questions of the Moodle, however, they have not delved into the context of the use of this platform in war-torn regions.

2. Materials and Methods

2.1. Participants

The participants in this study consisted of 120 teachers and 56 students from Ukrainian universities. The teachers cover a variety of academic disciplines and levels of experience. In addition, the participating students represent a wide range of undergraduate and postgraduate programmes, providing a comprehensive study of the impact of communication tools on Moodle at different levels of education.

Eligibility criteria for faculty include active engagement with the Moodle platform to deliver the course, so they are familiar with the functionality of the communication tools being explored. For students, participation is open to those currently enrolled in courses that actively use Moodle for academic activities.

2.2. Sample procedure

The sampling procedure uses a purposive sampling technique to ensure that participants are selected in a targeted and representative manner. This was done in stages (see Table 1).

Table 1 *Step-by-step sampling procedure*

Identification of Universities	The list of Ukrainian universities was created to cover a variety of institutions
Stratification by discipline	To ensure representation across academic disciplines, the sample is stratified based on the main fields of study.
Selection of participants	In each layer, teachers and students are randomly selected, ensuring proportional representation from different disciplines and levels of experience.
Informed consent	Before being recruited, all selected participants are provided with detailed information about the research objectives and procedures. Informed consent is obtained, emphasising voluntary participation and confidentiality.
Four-month testing period	Participants are informed about the extended nature of the study, which covers six months, during which they will actively use Moodle communication tools in their teaching or learning activities.

Regular inspections	Regular check-ins are held over a four-month period to monitor participant engagement, address any issues, and maintain a consistent dialogue between researchers and participants.

Thus, the careful selection and engagement of participants through this sampling procedure aims to provide a holistic view of the impact of communication tools on Moodle, taking into account differences in disciplines, teaching styles, and learning preferences over the long testing period.

2.3. Data collection

Surveys and interviews were used to collect data based on a previously formed list of questions. These tools were chosen due to the importance of highlighting different points of view and the representativeness of the obtained results.

Surveys

The survey was conducted at the end of the period of using Moodle's communication tools and features and assessed participants' experience, satisfaction, and perceived impact on student engagement and interaction. Open-ended questions and structured queries are used to collect both quantitative and qualitative data. Below is an example of the survey.

Part 1: Communication tools on Moodle.

1.1. What communication tools do you use in the Moodle system?

1.2. How do you assess the effectiveness of the messaging system for personal consultations and information exchange with teachers or students in the conditions of war?

- Very effective

- Effective.

- Less effective

- Not effective at all

Part 2. Engagement and Interaction (for teachers only).

2.1. How do you assess the level of student engagement on Moodle in the conditions of war ?

- High

- Medium

- Low

2.2. What communication tools do you consider to be the most effective for increasing interaction between participants in the Moodle learning process? (Select one or more options)

- Forums

- Notification system

- Chat

- Video conferencing

- Other

2.3 What improvements would you suggest to increase engagement and interaction on Moodle?

Part 3: General Impressions and Recommendations

3.1. In general, how would you rate the effectiveness of using the communication tools on the Moodle platform for your learning needs?

3.2. What advice would you give to optimise the use of communication tools on Moodle to improve the quality of education in the conditions of war?

Interview

Interviews were also conducted with a targeted subgroup of participants. Teachers and students are selected based on their active engagement with the communication tools and represent different disciplines. The interviews delve into more detailed aspects of their experiences, exploring challenges, success stories, and recommendations for improvement. Qualitative data from the interviews provide a deeper understanding of the participants' perspectives and enrich the overall analysis.

Usage analytics

The built-in analytics and tracking features of Moodle were used to collect quantitative data on the actual use of communication tools during the four-month testing period. The following aspects were taken into account:

1. Frequency of use. We tracked how often teachers and students use communication tools in Moodle.

2. Types of interaction. The types of interaction that contribute to a communication tool are identified, such as discussions, announcements, private messages, and collaborative activities.

3. Analysis of user behaviour. Data on user behaviour is examined to assess any correlations between usage patterns and perceived effectiveness of the communication medium.

Therefore, by adopting a multi-faceted approach to data collection, this study aims to triangulate the results, providing a complete and reliable understanding of the impact of communication tools on Moodle over the long-term testing period. The combination of quantitative usage data, survey responses, interview findings, and reflection journals enhances the reliability of the overall analysis.

2.4. Data analysis

The study uses statistical methods of data processing. Based on the analysis of qualitative data, a thematic analysis was carried out, obtained during interviews and surveys of teachers and students. Thus, the main points of view on the effectiveness of the use of communication tools on the Moodle platform are identified.

The selection of thematic analysis as the chosen method for analyzing qualitative data in this study is grounded in its suitability for capturing nuanced perspectives and patterns within the dataset. Thematic analysis offers a systematic approach to identifying, analyzing, and reporting themes or patterns of meaning across a dataset, making it particularly well-suited for exploring the diverse viewpoints on the effectiveness of communication tools on the Moodle platform. Furthermore, thematic analysis allows for flexibility in accommodating various data sources, such as interviews and surveys, which were utilized in this study. By integrating multiple sources of qualitative data, thematic analysis enables a comprehensive exploration of the research topic, ensuring a rich and detailed understanding of participants' experiences and perceptions. Overall, the rationale behind choosing thematic analysis lies in its capacity to systematically analyze qualitative data, its flexibility in accommodating diverse data sources, and its alignment with the exploratory nature of the research, ultimately facilitating a rigorous and insightful exploration of the effectiveness of communication tools on the Moodle platform.

3. Results

The Russian-Ukrainian war changed the way education was organized in Ukrainian institutions. Those institutions that are located near the areas of hostilities switched to the system of electronic or online training. Also, at the beginning of 2022, institutions that were located far from combat zones for security purposes also switched to online or mixed forms of education. This influenced the fact that teachers began to use various electronic platforms, in particular Moodle.

Moodle is a learning management platform that provides opportunities for communication and interaction between teachers and students. Using analytics on the use of the Moodle platform, the frequency of logins per week for Ukrainian teachers is 30 times. This indicates that, on average, each teacher logs into Moodle about 30 times a week in the conditions of war. The average number of logins per week for students is 15. In September, the average number of logins to Moodle for teachers was 25, and for students - 12. In November, faculty showed an increase in activity, reaching an average of 35 logins per week, while students increased their activity to 18 logins. Such changes in login rates may be related to the specifics of the academic year, certain academic events, or calendar features (see Figure 1).
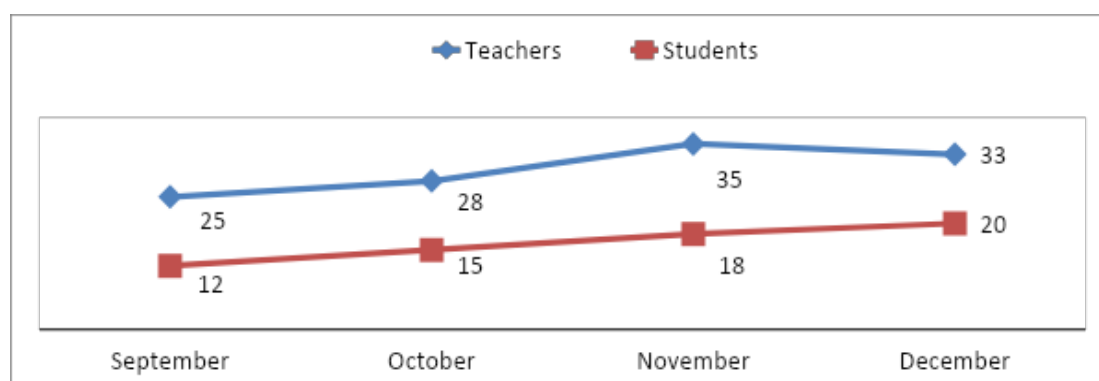

Figure 1. *Dynamics of logins to the platform over 4 months in the conditions of war*

Thus, it is possible to determine the peak periods when the maximum activity of logins was observed. In November, teachers were most active, logging in to Moodle an average of 35 times per week, which may be due to pre-exam consultations, assessments, and reporting. Students were most active in December, logging in to Moodle an average

of 20 times per week, which may be due to the exam period or active interaction in discussions.

Modern teachers use various means of communication on the Moodle platform. The most commonly used means consist of announcements, emails, and messages (82.50%). This may indicate the effectiveness of announcements and emails for sending out important information. A large number of teachers use chat rooms, which may indicate the popularity of this tool for quick information exchange (81.67%). A communication tool such as a blog is used by less than half of the teachers, which may indicate that it is less popular among the target audience (47.50%). Polls and voting are used by 65.83%). Although this tool is also used less, it is still popular among more than half of the teachers. Modern teachers also use forums, video lectures, and calendars in the Moodle system (see Table 2).

Table 2 *Main means of communication used by teachers*

Mean	Number of responses	%
Forums	89	74,17%
Chats	98	81,67%
Announcements	99	82,50%
Video lectures	89	74,17%
Polls and voting	79	65,83%
Blogs	57	47,50%
Email and messages	99	82,50%
Calendars	79	65,83%

The question of how do you assess the effectiveness of the messaging system for personal consultations and information exchange in the conditions of war concerned both teachers and students. The majority of the respondents rated the system as effective - 86 people (48.86%). Only a small part of the respondents consider the system less effective (15 people or 8.52% answered "less effective") and 4 people or 2.27% indicated "not effective at all".

Table 3 *Assessment of the effectiveness of the notification system*

How do you assess the effectiveness of the messaging system for face-to-face consultations and information exchange?	Number of responses	%
Very effective	71	40,34%
Effective	86	48,86%
Less effective	15	8,52%
Ineffective at all	4	2,27%

Thus, the vast majority of respondents (both teachers and students) consider the messaging system to be effective for personal consultations. A small percentage of respondents believe that the messaging system is less effective for personal consultations and information exchange. Therefore, this can serve as a basis for further improvements and identification of targeted strategies for using communication tools on the Moodle platform to improve learning processes and interaction between teachers and students.

The results of the survey on student engagement on the Moodle platform indicate some aspects of student interaction and perception of the learning platform. A high level of engagement was indicated by 42.50%, thus, a little more than half of the respondents believe that the level of student engagement on Moodle is high. This may indicate the effectiveness of the platform in arousing students' interest and activity. Half of the respondents (50%) consider the level of student engagement to be average. This may mean that the platform has a good impact on most students, but there is still room for improvement. A small number of respondents consider the level of student engagement to be low (7.5%). This may indicate that some aspects of the Moodle learning process may need to be developed or modified to increase student engagement (see Figure 2).
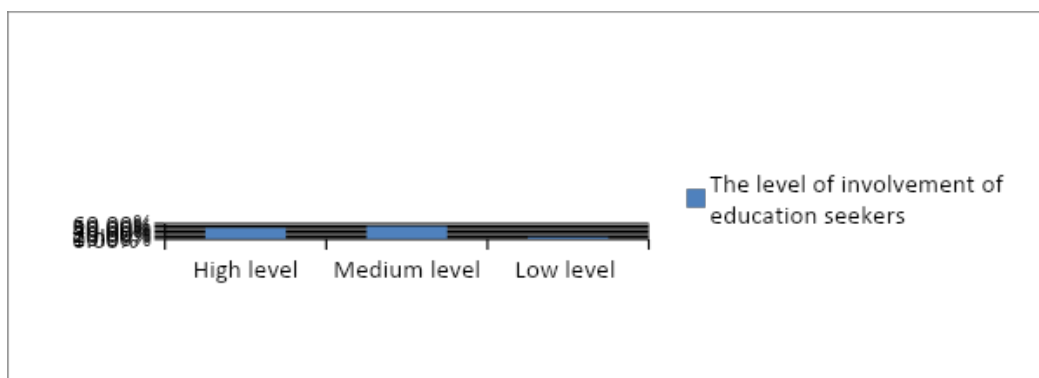
Figure 2. *Dynamics of levels of engagement of students*

Forums, chats, message system, announcements, videos, surveys, and blogs play an important role in increasing the engagement and interaction of students. The most effective means of communication (indicated by more than 50% of responses) are forums, messaging system, chats, video conferencing and announcements. Table 4. shows the functionality of these tools in the Moodle system.

Table 4 *Opportunities for using individual communication tools of the Moodle platform*

Tool name	Opportunities for engagement and interaction
Forums	Create thematic forums to discuss specific topics or tasks. Involve students in participation, create interesting questions and discussions. Set deadlines for commenting and interaction.
Chats	Use chats to quickly exchange information and answer students' questions. Organization of online consultations or "reception hours" for the convenience of students.
Announcement	The announcements section can be used to announce important events, changes in the learning process, or reminders of important deadlines.
Polls and voting	Surveys are used to measure student understanding and engagement. Voting is used to make decisions about course content or class format.
Video materials	Short video lectures and assignments can be recorded to personalise the material and make learning more accessible.

At the same time, the effectiveness of communication tools may depend on specific tasks, context, and features of the learning process. It is important to consider diversity and use different tools to optimise interaction in the Moodle learning environment. In general, the use of various communication tools on the Moodle platform will create an interactive and engaging learning environment, promoting student engagement and successful learning.

The Moodle platform, although known for its flexibility and the ability to deliver learning material anytime and anywhere, requires constant improvement to create a stimulating and effective learning environment. Therefore, we propose the following aspects of improving engagement and interaction among the participants of the learning process:

1. Optimization of the user interface. This means defining and implementing a user-friendly and intuitive interface to facilitate navigation and promote comfortable use of the platform.

2. Organization of learning content. Careful structuring of courses with quick access to materials, assignments, and additional resources for effective learning.

3. Stimulating student activity. Use of interactive tasks, quizzes, discussions, and group projects to engage and support student activity.

4. Improvement of the notification system. Improve the notification system to ensure effective communication between participants and facilitate information sharing.

5. Use of social elements. Introduce social features such as comment walls, group chats, and information sharing between users to create a supportive environment.

6. Online consultations and reception hours. Organizing regular online consultations to provide students with the opportunity to seek help and resolve their issues.

These activities are aimed at creating an interactive, engaging, and effective learning environment on the Moodle platform, where every student can feel involved and interact with the learning process to the fullest extent possible.

Discussion

The obtained results indicate the importance of certain means of communication in the Moodle system for improving interaction in the conditions of the Russian-Ukrainian war. The obtained data in general indicate the popularity of various means of communication in the Moodle system: forums, announcements, chats, etc. The results indicate that the majority of respondents, including teachers and students, are convinced that the message system is highly effective for personal consultations, even in wartime. A small percentage of respondents indicated that this system is less effective for personal consultations and information exchange. These thoughts can serve as a basis for further improvement and development of targeted strategies for using communication tools on the Moodle platform to improve learning processes and interaction between teachers and students in the

context of military challenges. All these aspects indicate the adaptability and flexibility of the analyzed platform, which can be traced in modern works (Frisnoiry & Darari, 2020; Schoblick, 2020b; Srivastava & Srivastava, 2021). The results also provide recommendations for optimizing the engagement of students through communication. In particular, careful structuring of courses is suggested. This aspect of improving this platform is also found in contemporary works (Schoblick, 2020a). In particular, Melnyk & Volchkova (2021) note that for the sake of learning effectiveness, the use of the asynchronous Moodle platform should be combined with the potential of synchronous organization of classes in Zoom or Meet, Skype, etc. This, in turn, will allow visualizing the learning process. At the same time, this platform demonstrates its effectiveness in a mixed or purely distance learning environment, as demonstrated in modern works (Flores-Piñas et al., 2022; Posese-Okesene, 2017; Satriani et al., 2021).

The results also show that all communication tools of the Moodle system are important for improving the engagement of students in the conditions of Russian-Ukrainian war. The importance of students' perception of this platform is emphasised by Waheed et al. (2016); Rahari et al. (2023).

Based on the survey findings conducted by Melnyk & Volchkova (2021), 48.3% of respondents expressed a positive evaluation of the quality of distance courses, while 34.5% held a negative perspective, and 17.2% remained neutral. These results suggest that despite encountering some challenges during distance learning, students demonstrate a readiness to engage with distance education methods. Moreover, respondents identified several advantages, with the most prominent being the ability to balance study and work simultaneously (32.4% of respondents) and the flexibility to plan their study schedules more effectively (29.7%). Thus, these results also support the idea of the importance of this platform in the e-learning system in the combat zone.

Therefore, this work includes an in-depth analysis of various communication tools on the Moodle platform, such as forums, messaging system, chat, etc. The novelty lies in the fact that the study covers not only individual tools but also their interaction and impact on the engagement and interaction of participants in the educational process. The innovation of the study is also determined by its duration - a four-month study period allows us to gain a more complete picture of the dynamics of use and impact of communication tools on the Moodle platform over a long period of time. At the same time, the study takes into account the opinions of both key groups - teachers and students.

This provides a more complete picture of the effectiveness and possible areas for improvement.

The results of the study will become a practical guide for teachers and administrators of the Moodle platform, helping them to optimise the use of communication tools to increase the engagement and interaction of students in the conditions of war. Also, the practical significance of the work is to provide specific recommendations for improving communication tools on Moodle during future military operations. At the same time, certain limitations should be taken into account. Firstly, it is worth considering that the study is limited to the use of the Moodle platform, and its results may not be directly applicable to other learning management systems. Another important aspect is the focus on the Ukrainian learning environment. The sample of participants is limited to teachers and students from Ukrainian universities, which may limit the external validity of the study. The authors of the article do not deny the fact that the assessments are subjective. Assessments of the effectiveness of communication tools are based on teachers' and students' own beliefs and impressions, which can introduce subjectivity into the results. Therefore, it is important to take these limitations into account when interpreting and generalizing the results of the study. Nevertheless, despite these limitations, the study confirms the effectiveness of the use of communication tools in the Moodle platform system. Thus, this study has the potential to become an important step in improving the use of communication tools on the Moodle platform and contribute to the further development of modern education.

Conclusions

Thus, the study confirms that communication tools on the Moodle platform are important for teacher-student interaction and for creating an engaged learning environment in the conditions of Russian-Ukrainian war. According to the participants, the forums and the message system are recognized as the most effective for communication and discussion. This indicates their importance in terms of increasing interaction. At the same time, many teachers and students rated the engagement on the Moodle platform as average. This may be due to the variety of interfaces and certain factors of activation of the hybrid Russian-Ukrainian war. There are also some differences in the assessment of the effectiveness of communication tools between teachers and students, which can also be explained by the different military conditions of certain students and teachers. Those individuals who were

near the blue front rated the quality of the platform below average, which can be explained by Internet failures and poor communication quality.

At the same time, this study provides a valuable contribution to understanding the effectiveness of communication tools on Moodle and indicates possible ways to further improve online education for teachers and students. In particular, a number of measures and improvements should be implemented to improve engagement and increase interaction of learners on the Moodle platform. Optimization of the user interface, organization of learning content, and stimulation of student activity play a key role in creating an attractive and effective learning environment. The use of video materials, the development of a messaging system, and social elements will help to improve communication. Additionally, the organization of online consultations and reception hours will help to provide students with additional support and address their questions. Summing up these measures, you can create an interactive and engaging learning environment on the Moodle platform, even in times of war.

Improving engagement and interaction on the Moodle platform requires a multifaceted approach that considers both the technological capabilities of the platform and the pedagogical strategies employed by instructors. There are some specific and actionable recommendations supported by empirical evidence and best practices. Firstly, incorporate interactive elements such as quizzes, polls, and interactive multimedia into your course content. Moreover, regular and timely feedback is essential for student engagement and learning. Secondly, utilize Moodle's grading and feedback tools to provide personalized feedback on assignments, quizzes, and forum participation promptly. In addition, implement active learning techniques such as problem-based learning, case studies, and simulations within Moodle courses. Active learning has been shown to enhance student engagement and critical thinking skills. These recommendations will contribute to the effective use of this platform for the implementation of e-learning or blended learning.

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