International Journal of Pedagogics

VOLUME Vol.06 Issue03 2026
PAGE NO. 90-94
DOI 10.37547/ijp/Volume06Issue03-17

Pedagogical Potential of LMS And Videoconferencing Platforms in Developing Digital Literacy in Higher Education

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Received: 27 January 2026; **Accepted:** 23 February 2026; **Published:** 15 March 2026

Abstract: This study is dedicated to analyzing software tools used in higher education institutions to develop students' digital literacy and their didactic potential in the educational process. In the context of digital transformation, the integration of modern information and communication technologies into the learning environment is of critical importance for effectively organizing educational activities. From this perspective, the study scientifically examines how Learning Management System (LMS) platforms and videoconferencing services influence the development of students' digital competencies. The results indicate that LMS platforms serve as effective tools for organizing learning materials, managing assignments, and monitoring students' learning activities. Videoconferencing platforms, in turn, facilitate interactive communication among students, support collaborative projects, and enable effective implementation of distance learning. Analyses demonstrate that an integrated digital environment positively affects students' technical literacy, information management skills, media literacy, and cybersecurity awareness.

Keywords: Digital literacy, Learning Management System (LMS), videoconferencing platforms, digital learning environment, students' digital competence, Moodle, Google Classroom, distance learning technologies.

Introduction: In recent years, the process of digital transformation in the educational system has accelerated, making the use of modern information and communication technologies in organizing higher education processes increasingly important. Integrating digital technologies into educational practices not only modernizes teaching methods but also contributes to the development of students' digital literacy. Digital literacy is now considered a key competency of modern specialists, encompassing skills such as information management, effective use of digital tools, online communication, media content creation, and adherence to cybersecurity requirements.

In higher education institutions, the development of digital literacy largely depends on the effective organization of the digital learning environment [7]. Modern educational environments rely heavily on Learning Management System (LMS) platforms, videoconferencing services, and online collaboration tools. These software solutions enable the management of learning processes, structuring of educational materials, facilitation of interactive communication, and monitoring of student activities.

A contemporary digital learning environment cannot operate efficiently without multifunctional and integrated software tools. Each component of digital literacy—technical skills, information management, communication competencies, media literacy, cybersecurity awareness, content creation, and problem-solving competencies—is developed and reinforced through specific software tools. Therefore, this section systematically analyzes the functional capabilities of each tool, its role in the educational process, its impact on learning effectiveness, and its advantages and limitations. The main objective of this analysis is to clarify the didactic foundations for selecting and using software tools in higher education to effectively develop digital literacy, providing a

scientific rationale for each tool's contribution to students' digital competencies. This, in turn, can inform pedagogical practice by creating goal-oriented, step-by-step methodological approaches for fostering digital literacy.

METHODS

The review of the literature indicates that LMS platforms support students' independent learning activities, facilitate effective communication between instructors and students, and allow for individualized educational processes. Research by Filatova has highlighted Google Classroom as an effective tool for organizing e-courses and managing learning activities [1]. Mandik's studies further emphasize that modular learning organized through digital technologies positively influences students' stepwise knowledge acquisition and enhances their motivation [4].

However, while numerous studies have explored the functional capabilities of individual platforms, there has been insufficient comprehensive analysis of various software tools in developing digital literacy components. Accordingly, this study systematically analyzes the pedagogical potential of LMS platforms and videoconferencing services used in higher education, as well as their impact on the learning process.

Gunawan, Sutisna, and Ana examined the role of LMS platforms in developing instructors' digital literacy based on scientific literature [2]. They argue that LMS systems are crucial for creating, storing, and managing educational materials, as well as facilitating effective online communication between instructors and students. According to them, platforms such as Moodle, Google Classroom, and Canvas expand instructors' abilities to use digital technologies, create digital content, and manage the educational process in a digital environment. Effective use of LMS systems also contributes to instructors' competencies in information management, media literacy, and online collaboration. The authors emphasize the need to widely implement LMS platforms in educational institutions and organize methodological training aimed at enhancing instructors' digital competencies.

Initially, the study employed literature analysis to examine contemporary sources related to digital literacy, digital competencies, and digital learning environments. This stage included international scientific journals, research on educational technologies, and official technical specifications of digital learning platforms, providing the theoretical foundation for the study.

Subsequently, content analysis was applied to examine the functional capabilities of widely used LMS platforms in higher education (Moodle, Canvas LMS, Chamilo) and videoconferencing services (Zoom, Google Meet, Microsoft Teams). Platforms were analyzed according to criteria including the ability to manage learning materials, interactive communication tools, assignment assessment mechanisms, collaborative work features, and integration with other digital services.

Comparative analysis was also conducted to evaluate the technical and pedagogical capabilities of the selected platforms. The assessment considered features available in free versions, user interface convenience, participant capacity, meeting duration, and integration potential.

RESULTS

The study analyzed the functional capabilities of major LMS platforms and videoconferencing services used in higher education. Findings indicate that Moodle, Canvas LMS, and Chamilo provide tools for managing the learning process, structuring educational materials, and automating assessment procedures.

Among videoconferencing platforms, Zoom, Google Meet, and Microsoft Teams were identified as the most widely used services, each with strengths and limitations suited to various educational needs.

These platforms facilitate students' and instructors' active participation in distance learning, promote interactive communication using modern digital tools, enable presentations, document handling, and collaborative project implementation. Consequently, students develop competencies in technical skills, communication, information management, media literacy, and cybersecurity. The interactive and secure digital environment created through these platforms not only improves educational quality but also deepens digital culture understanding.

Table 2.1 – General Comparison (Free Plan)

Feature	Zoom	Google Meet	Microsoft Teams
Group Meeting Duration	40 min	60 min	60 min
Participants	Up to 100	Up to 100	Up to 100
Primary Purpose	Videoconferencing	Videoconferencing	Collaboration & Chat
Integration	Calendar, Slack	Google Workspace	Microsoft 365
User-Friendliness	Good (app required)	Excellent (browser-based)	Moderate (many features)
Most Suitable	Academic seminars, online classes	Online classes, quick meetings	Collaborative projects, group assignments, seminars

In the context of teaching via video conferencing, the following encompasses the technical, pedagogical, and organizational skills necessary for an instructor to organize a lesson effectively.[6] Distance learning through video conferencing is an ecosystem entirely different from the traditional classroom. To succeed in this format, it is not enough for an instructor to simply know their subject; they must operate at the intersection of technology, psychology, and management.

Technical skills are not just about "connecting," but also about communicating without barriers in a digital environment.

Platform Management. The instructor must be able to use functions such as "Breakout rooms," "polls," and "whiteboards" on platforms like Zoom, MS Teams, or Google Meet.

Multimedia Literacy. Research shows that poor audio quality in an online lesson reduces the student's information absorption rate. The instructor must ensure that the microphone, lighting, and background behind the frame serve the purpose of the lesson.

Cyber-security and Ethics. Preventing unauthorized access to the lesson and protecting students' personal information is a part of technical culture.

Pedagogical Skills are in video conference teaching, the "lecture" format loses its effectiveness. Here, interactivity is the fundamental rule.

Managing Cognitive Load. According to Richard Mayer's "Multimedia Learning" theory[5], the human brain cannot simultaneously read complex slides and understand the instructor's speech. The instructor must maintain a balance between visual and audio information.

Active Learning. In an online environment, a student's attention is easily distracted. The instructor should incorporate interactive tasks, "Q&A" sessions, or gamification elements every 10-15 minutes.

Feedback. To ensure that the student does not feel "alone" in distance learning, the instructor must establish rapid and constructive feedback (via chat or voice).

Organizational Skills an online lesson is the strict management of time and resources.

Time Management. One minute of an online lesson requires energy equivalent to two minutes of an offline lesson. It is required to build the lesson structure based on a strict plan (an "icebreaker" exercise, the main part, and a conclusion).

Scenario-based Work. An effective instructor does not just speak about the topic but creates a "digital scenario" of the lesson. This clearly defines when a video will be played and when group discussions will take place.

Managing Group Dynamics. To manage 30 students behind the screen, the instructor must maintain visual contact (looking at the camera) and create a democratic environment that encourages every participant to engage.

The table below summarizes the interconnection of these skills.

Skill Type	Goal	Result
Technical	Removing barriers	Continuous communication
Pedagogical	Teaching methodology	High mastery/absorption
Organizational	Discipline and interest	Efficient use of time

Comparative analysis shows that Moodle, as an open-source system, stands out for its flexibility and extensive module library. Canvas LMS is distinguished by its user-friendly interface and SpeedGrader for rapid assessment, while Chamilo is simple and freely available, making it suitable for smaller educational institutions.

Videoconferencing platforms analysis revealed that Zoom, Google Meet, and Microsoft Teams are widely applied in educational processes, supporting up to 100 participants in free versions and 40–60 minute session durations. Zoom is suitable for academic seminars and interactive lessons, Google Meet provides fast browser-based access, and Microsoft Teams excels in organizing collaborative projects and group learning activities.

DISCUSSION

The study demonstrates that LMS platforms such as Moodle, Canvas LMS, and Chamilo are effective tools for developing students' digital literacy in higher education. Moodle's flexibility and extensive module library allow individualization of learning processes and customization of materials to meet students' needs. Canvas LMS provides pedagogical convenience through its user-friendly interface, SpeedGrader, and other integrated tools. Chamilo's simplicity and free access make it suitable for smaller institutions. These findings align with Gunawan, Sutisna, and Ana (2024), who note that LMS systems enhance instructors' abilities to effectively use digital technologies and create digital content [2].

Regarding videoconferencing platforms, Zoom, Google Meet, and Microsoft Teams facilitate interactive communication, collaborative projects, and effective management of distance learning. Analyses indicate that Zoom is convenient for academic seminars and interactive lessons, Google Meet offers quick access via browser, and Microsoft Teams ensures high pedagogical efficiency in collaborative and group activities. These findings are consistent with Go (2022), confirming that integrated use of LMS and videoconferencing platforms significantly contributes to developing students' technical skills, information management, media literacy, and cybersecurity awareness [3].

Moreover, integrated digital environments enhance learning quality, strengthen students' motivation for independent study, and enable efficient management of pedagogical processes. These results correspond to findings by Filatova (2023) and Mandik (2023), highlighting that LMS systems and modular learning approaches support stepwise knowledge acquisition and enhance learning motivation. Platform usability, functionality, and integration level significantly influence pedagogical effectiveness.

In conclusion, the effective integration of LMS and videoconferencing platforms enriches digital learning environments, broadly develops students' digital competencies, and optimizes pedagogical processes in higher education. These findings provide educators with practical guidance for methodological planning, curriculum design, and strategic improvement of digital education.

CONCLUSION

This study demonstrates that LMS platforms (Moodle, Canvas, Chamilo) and videoconferencing services (Zoom, Google Meet, Microsoft Teams) are essential pedagogical tools for developing digital literacy in higher education. LMS platforms facilitate organization

of learning materials, assignment management, assessment, and individualization, whereas videoconferencing services support interactive communication, collaborative projects, and effective distance learning.

An integrated digital environment fosters students' technical skills, information management, media literacy, and cybersecurity awareness, while also optimizing pedagogical processes and enabling efficient monitoring of learning activities [8]. The study offers educators clear practical recommendations for effectively integrating LMS and videoconferencing platforms, developing methodological resources, and enhancing digital competencies.

Limitations include restrictions of free platform versions, technical issues, and differences in user experience. Future research may focus on measuring the effectiveness of LMS and videoconferencing platforms in developing individual competencies and deepening pedagogical integration.

The scientific contribution of this study lies in systematically identifying the pedagogical potential of LMS and videoconferencing platforms for developing digital literacy and scientifically substantiating their didactic significance. Its practical value is reflected in optimizing digital education and effectively developing students' digital competencies in higher education.

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