Model to improve distance learning system LOOMEN

Karlo Čuković - Tkalčec
Koprivnički Bregi Elementary School, Koprivnica, Croatia, kcukovic@gmail.com

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Abstract: This research study focuses on analyzing the functionalities and potential improvements of the Loomen platform, the most widely used LMS system in Croatian education. The aim of the study was to identify the strengths and weaknesses of the platform and propose solutions that could enhance user experience and improve pedagogical outcomes. The research was conducted during a teaching internship at a high school, where hands-on experience with daily system use was gathered, and through a survey administered to students and teachers. The survey collected both quantitative and qualitative data on usage frequency, technical difficulties, satisfaction with functionalities, and suggestions for improvement. The results indicate that students and teachers value the ability to access teaching materials and submit assignments, but they highlight issues with the user interface, mobile version, and communication tools. Students perceive communication via forums and messaging as outdated and insufficiently engaging, which reduces interaction in the learning process. Based on the collected data, a list of functionalities and identified shortcomings was compiled, followed by proposals for improvement: interface redesign, optimization for mobile devices, introduction of a self-assessment module, and richer multimedia content. The paper concludes by emphasizing that the proposed measures have the potential to increase student motivation and satisfaction, as well as to improve the quality of distance learning.

Keywords: e-learning, LMS, Loomen, digital education

Introduction

Education in recent decades has been undergoing the most dynamic changes in its history. The development of digital technologies, high-speed internet, mobile devices, and artificial intelligence has introduced completely new ways of teaching and learning, pushing the boundaries of the traditional classroom and paving the way for the concept of lifelong learning. Today, knowledge is no longer transmitted exclusively through direct interaction between students and teachers, but also through digital platforms and educational systems that enable learning "anytime and anywhere" [2].

This process of digital transformation in education coincides with the development of so-called LMS (Learning Management System) platforms – information systems designed for organizing, managing, and evaluating learning. LMS systems allow teachers to create, publish, and monitor educational activities, while providing students with a centralized environment for accessing materials, assignments, and feedback. According to [2], LMS has become the foundation of modern e-learning, as it provides a unique meeting point between pedagogy, technology, and the management of the educational process.

In the Croatian education system, the most widely used LMS platform is Loomen, developed and maintained by CARNET. It is based on the open-source system Moodle, which is globally recognized as a flexible and adaptable open-source platform. Loomen was conceived as a national digital educational tool that enables students and teachers to easily exchange teaching materials, participate in online tests, communicate through forums, and store their learning results. During the COVID-19 pandemic, Loomen, together with Microsoft Teams, became a key tool for ensuring the continuity of education in Croatia—from primary and secondary schools to higher education institutions. This situation rapidly accelerated the process of digital transformation but also revealed a number of limitations of the existing digital tools [3].

An analysis conducted during the preparation of this paper showed that, despite its overall functional-

ity and widespread use, Loomen does not fully exploit its pedagogical potential in practice. Although it allows for the digital organization of teaching, the pedagogical and motivational components of the system often remain underdeveloped. The mere availability of tools does not automatically ensure their effectiveness— as [6] emphasizes, successful e-learning requires a synergy between technical performance and pedagogical design, with technology serving educational goals rather than dictating them.

Experiences of students and teachers gathered through a survey conducted in a high school setting further confirm this assumption. The participants most frequently highlighted several issues: an unclear user interface, slow system performance, poor optimization for mobile devices, and limited possibilities for interactive communication. Students, for instance, noted that forum communication feels "outdated" and that they prefer using external applications such as WhatsApp or Discord for collaboration. They also emphasized the need for greater content diversity—more video lessons, multimedia presentations, and interactive exercises instead of predominantly static Word and PowerPoint documents. Such findings confirm results from other studies suggesting that today's students, as so-called digital natives, prefer dynamic, visually engaging, and interactive content [5].

Teachers, on the other hand, expressed satisfaction with functions that simplify administration and grading but pointed out that the process of creating digital materials is too time-consuming, and that the tools for monitoring student activity and providing automated feedback are limited. Their comments indicate a need for a smarter system of tracking and self-assessment that would allow both students and teachers a clearer insight into progress and understanding of the material.

All of this indicates that Loomen has reached a critical stage in its development: it is technically stable and widely implemented but lacks the elements that would make it pedagogically more effective and motivationally engaging. In the context of modern digital pedagogy—where the emphasis is on active learning, self-regulation, and collaboration—such aspects are crucial for the success of digital education [6].

The aim of this paper is to analyze the current state of Loomen, identify its key strengths and weaknesses, and, based on the obtained data and theoretical framework, propose a model for improving the platform. The model will cover four main areas:

1. Improving the user interface and navigation
2. Introducing modules for self-assessment and reflection
3. Integrating multimedia and interactive content
4. Ensuring technical stability and better mobile adaptation

The paper does not deal with the technical implementation of the system but rather provides a **pedagogical-technological framework** that illustrates how the platform should be designed to support modern forms of learning. In this sense, Loomen is viewed as a living system that evolves along with the needs of its users and digital trends.

In conclusion, this paper starts from the premise that technology alone does not guarantee quality learning—it does so only when it serves an educational purpose. Therefore, improving Loomen does not merely imply technical modernization but primarily the alignment of technological solutions with pedagogical goals and the real needs of students and teachers. In this way, the main objective of the paper is achieved: to develop a sustainable model of digital education that is functional, motivating, and centered on the learner as an active participant.

RESEARCH METODOLOGY

To obtain a comprehensive and objective insight into the functionalities and capabilities of the Loomen platform, this study applied a combined methodological approach that includes an analysis of relevant literature, an evaluation of the system's functionalities through practical use of the platform, a comparative analysis with other LMS solutions, and the collection of feedback from actual users. Such an approach enables the integration of quantitative and qualitative indicators and provides a holistic understanding of the system's technical, pedagogical, and user-oriented aspects.

Research Framework and Objectives

The main objective of this research was to identify the key strengths and weaknesses of the **Loomen** platform from the perspective of end users — students and teachers — and to propose recommendations for its

improvement in both technical and pedagogical terms. The specific objectives were:

1. To analyze the existing functionalities of Loomen and their pedagogical relevance
2. To determine which usability issues most affect learning effectiveness
3. To examine the user experience of students and teachers
4. To propose a set of improvements aligned with the theoretical and practical needs of e-learning

The methodology was designed in accordance with the recommendations of [2], who distinguishes three levels of scientific research: theoretical (literature review), empirical (data collection and analysis), and applied (implementation of results in the form of improvement proposals).

Platform Analysis and Experiential Testing

The first stage of the research involved a detailed examination of the Loomen platform's functionalities. For this purpose, a test user account was created with two levels of access — teacher and student roles — which enabled a comprehensive insight into the system from both perspectives. The testing process covered the following key functions:

1. Creation and distribution of teaching materials
2. Design and administration of online tests
3. Assignment submission and grading
4. Monitoring of student progress
5. Communication through forums and internal messages
6. Integration of external content (images, PDFs, videos, H5P activities, etc.)

Special attention was given to the clarity of the user interface, system responsiveness, and mobile adaptability, as these elements have often been identified in previous studies as key factors influencing user satisfaction [4]. Figure 1 shows the home page of the test course created within the subject *Informatics*.

User Data Collection

Another important segment of the research involved collecting data from actual users — high school students and teachers. A survey was created using Google Forms and distributed digitally to ensure accessibility and respondent anonymity. The survey included 80 students and 4 teachers who regularly use the Loomen platform in their teaching activities.

The questionnaire consisted of 18 questions divided into three sections:

1. Frequency and manner of platform use (e.g., how often users access Loomen, from which devices, and for what purposes),
2. User experience and satisfaction level (evaluation of functionalities such as tests, forums, and clarity of learning materials),
3. Suggestions and comments for improvement (open-ended questions).

The responses were analyzed using a combination of descriptive statistics (expressed in percentages and frequencies) and thematic analysis for qualitative responses. This approach provided insight not only into what users do on the platform, but also into

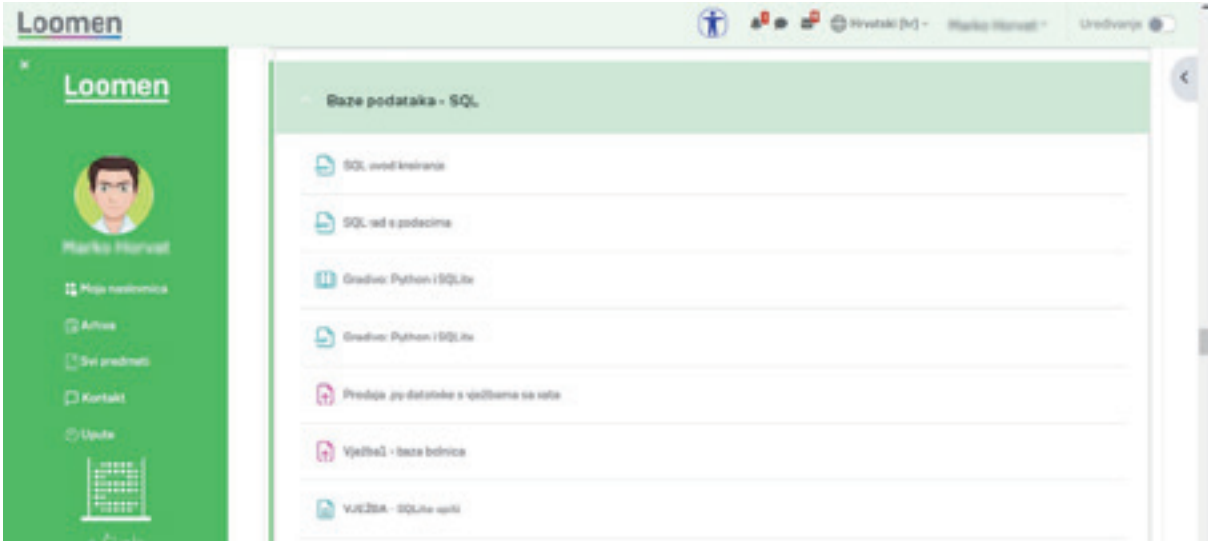

Figure 1- *Homepage of the Loomen Course: Informatics*

Figure 2- *High School Students Participating in the Survey on the Functionality of Loomen*

how they experience it.

Figure 2 shows high school students who participated in the survey on the use of Loomen.

In addition to collecting user feedback, a comparative analysis was conducted with several other popular LMS platforms, including Moodle (on which Loomen is based), Microsoft Teams, and Google Classroom. The analysis involved a review of their functionalities, methods of integration with other tools, and the flexibility of adapting to teachers' needs. This comparison proved valuable in identifying both the advantages that Loomen already possesses and the functionalities that are better implemented in other systems and could potentially be incorporated into Loomen in the future.

The collected data were then categorized into three main groups:

- Technical features (system stability, loading speed, mobile support),
- Pedagogical features (progress tracking, student motivation, interactivity), and
- User experience (interface clarity, ease of use, communication options).

This categorization helped clearly distinguish issues arising from the system's technical limitations from those related to didactic design and content organization.

Based on the collected and analyzed data, a list of functionalities currently available in Loomen was

Table 1-Current *Functionalities of the Loomen Platform*

Functionality	Description
Access to Teaching Materials	Students can access documents (PDF, Word, PPT) and multimedia files published by teachers.
Assignment Submission	Enables uploading and submitting assignments within specified deadlines.
Tests and Quizzes	Allows the creation and completion of tests and quizzes with automatic grading.
Forum and Internal Messages	Communication between students and teachers through discussion forums and private messages.
Grades and Feedback	Provides an overview of grades and teacher comments for each assignment or test.
Progress Tracking	Displays student activity, lesson completion, and task progress.

Table 2- *Identified Weaknesses and Proposed Improvements*

Identified Weakness	Proposed Improvement
Unclear user interface	Redesign the interface with a focus on simpler navigation and a more modern appearance.
Difficult login and occasional technical issues	Improve system stability and enable faster login, especially during periods of high demand.
Outdated communication tools (forum, messages)	Integrate a modern chat module and enable video communication features.
Lack of multimedia content	Increase the use of video lessons, interactive quizzes, and presentations.
Weak mobile version	Ensure full optimization for mobile devices and tablets.
Insufficient options for self-assessment	Introduce a module for self-check and content revision.

created (Table 1), along with a separate list of shortcomings and potential improvements (Table 2).

Comparative Analysis with Other LMS Platforms

To place Loomen within a broader context, a comparative analysis was conducted with three of the most widely used LMS solutions:

- Moodle
- Microsoft Teams
- Google Classroom

The analysis included an evaluation of core functionalities, user adaptability, multimedia integration, and options for tracking student progress. The results showed that Moodle, as the original platform on which Loomen is based, offers the greatest flexibility in configuration, while Teams and Classroom provide simpler but less customizable systems. This confirmed that Loomen has a solid technical foundation, yet requires modernization of the user experience to keep up with its competitors.

Although this paper does not describe the technical implementation of proposed solutions, the recommendations serve as guidelines for further development of the platform and may act as a starting point for future researchers and IT specialists working on its improvement.

Such a comprehensive methodological approach ensures that the analysis is not limited to the author's subjective impression but is based on a combination of experiential data, survey results, and comparative analysis. In this way, the findings gain greater credibility and can be considered representative of the broader population of platform users.

Analytical Framework of the Research

All collected data — surveys, testing notes, and comparative analysis (Table 3) — were classified into three main categories that constitute the analytical framework of the research.

This framework made it possible to systematically distinguish between problems arising from techni-

Table 3- *Analytical Framework of the Research*

Category	Key Elements	Purpose of the Analysis
Technical Features	Stability, speed, mobile support, integration	To assess the system's reliability and accessibility
Pedagogical Features	Interactivity, motivation, formative assessment	To determine the system's impact on the learning process
User Experience (UX/UI)	Clarity, intuitiveness, communication	To evaluate user satisfaction and engagement

cal limitations and those resulting from insufficient pedagogical design.

Validation and Limitations of the Research

To ensure credibility, the survey results were compared with available studies on the use of the Moodle and Loomen platforms within the Croatian educational context [3]. Although the sample was limited to one high school, the obtained results provide valuable insights into user experience that can be applied more broadly within the context of secondary education.

The main limitations of the research relate to:

- the small number of respondents in the teacher group,
- the potential subjectivity of survey responses, and
- the absence of technical implementation of the proposed solutions.

Despite these limitations, the combination of empirical data, testing, and comparative analysis makes this methodology a relevant and reliable basis for formulating recommendations for improving the platform.

The research process and its stages are presented in Figure 3.

RESULTS AND DANA ANALYSIS

Based on the conducted analysis of the **Loomen** platform's functionalities, as well as the survey carried out among students and teachers, a comprehensive overview of the current state of the system was obtained. The results are presented in several thematic sections covering available functionalities, the most common issues encountered when using the platform, frequency of use, and user suggestions for improvement. Such a presentation provides a holistic insight not only into the system's technical capabilities but also into how it is perceived and utilized in real educational settings.

Currently Available Functionalities

The Loomen platform enables a wide range of activities that support the teaching process and facilitate communication between students and teachers. The most significant among these include:

- **Access to teaching materials** – Teachers can upload learning content in the form of MS Word documents, PowerPoint presentations, PDF files, images, and links to external sources. The materials are organized by topics and weeks, which allows easier navigation and systematic tracking of the curriculum. For students, this means convenient access to learning materials at any time, without the need for additional tools or platforms.
- **Test creation and administration** – The quiz and test creation feature enables teachers to design various types of questions, including multiple choice, true/false, fill-in-the-blank, matching, and essay questions. The system automatically grades closed-ended questions, while open-ended ones are assessed manually, giving teachers greater flexibility in evaluation. Students particularly appreciate the immediate feedback provided after each test, which encourages revision and self-reflection.
- **Assignment submission and grading** – Digital submission of assignments significantly improves organization and reduces the administrative workload for teachers. Students can submit their work in various formats, and the system records submission times, ensuring transparency. Teachers can add comments and suggestions for each submission, fostering a more effective learning process through constructive feedback.
- **Communication** – Loomen offers a discussion forum for each course unit, the ability to send private messages, and post announcements about upcoming activities. Although these tools are functional, they tend to be underused in practice, as students prefer faster and more modern communication channels. However, the forum still has potential as a tool for structured discussions and exchange of ideas, especially when combined with moderated assign-

Figure 3- *Research Flow Diagram*

ments and group projects.

- **Student progress tracking** – Teachers have access to students' activity data, test results, and the number of visits to course materials. This information helps identify students who are struggling or not actively participating, enabling early detection of learning difficulties.
- **Multimedia integration** – The system supports embedding videos, audio files, external links, and H5P interactive content, allowing the creation of more dynamic and engaging lessons. This makes the learning process more visually appealing and adaptable to different learning styles.

Although these functionalities form a solid foundation for conducting online instruction, their usability and quality of implementation largely depend on the teachers' **digital competencies** and the school's **technical infrastructure**. Some teachers take advantage of advanced features, while others use the platform solely as a repository for teaching materials. This results in considerable variation in the quality of user experience among students across different subjects and teachers.

Frequency of Use and User Satisfaction

The results of the survey conducted among students and teachers indicate that Loomen is becoming an increasingly common tool in the daily educational process, although its frequency of use still varies significantly across subjects and depends largely on the individual teacher's approach. In most cases, the platform is used regularly, but it has not yet been fully integrated as the main learning tool; rather, it primarily serves as a support to traditional teaching.

Teachers most frequently use Loomen for publishing teaching materials, assignments, and tests, while communication tools such as forums and messages are less utilized. Most teachers emphasized that forums require more time to manage and fail to attract students who prefer faster, more modern, and visually dynamic platforms.

User satisfaction reveals two opposing tendencies. On one hand, students highlight the practicality and organization of Loomen—the fact that they can access all learning materials in one place and more easily keep track of their assignments. On the other hand, users report technical difficulties, particularly occasional system slowdowns and the limited functionality of the mobile version. A large number of students stated that they most often access the platform via smartphones but that it "sometimes responds slowly or fails to load all elements correctly."

These findings indicate the need for further technical optimization, especially in terms of mobile accessibility and system stability. At the same time, the high level of satisfaction with the platform's basic functionalities suggests that Loomen already effectively supports digital learning, but certain improvements are required to increase student motivation, interactivity, and overall platform efficiency.

Identified problems

The results of the survey conducted among students and teachers show that Loomen is becoming an increasingly common tool in everyday educational practice; however, the frequency of use varies depending on the subject and the teacher's approach. According to the collected data, 68% of students use the platform at least once a week, 24% several times a week, while only 1% use Loomen on a daily basis. These results suggest that the platform has not yet been fully integrated into the teaching process as the main learning tool, but rather serves primarily as support to traditional instruction.

Teachers most frequently use Loomen for publishing teaching materials, assignments, and tests, while communication tools and forums are less commonly used. In interviews and open-ended survey responses, most teachers emphasized that maintaining the forum requires additional time and that it fails to engage students who are accustomed to faster and more visually appealing platforms.

User satisfaction demonstrates two contrasting tendencies. On one hand, students expressed strong satisfaction with the ability to access all learning materials in one place, noting that Loomen helps them organize their learning and keep track of assignments. On the other hand, both students and teachers reported technical difficulties, including occasional system slowdowns, crashes during peak usage, and problems when accessing the platform via mobile devices. More than half of the students (52%) stated that they most often access Loomen through their smartphones, but that "pages sometimes do not respond properly or load too slowly."

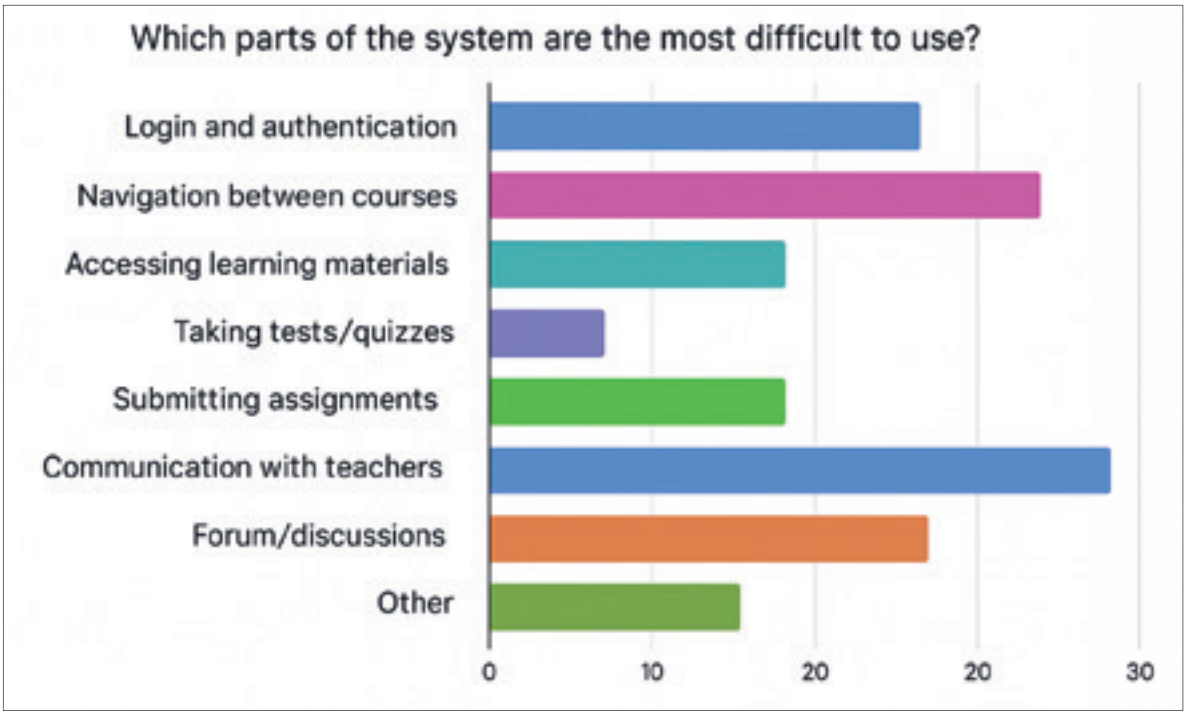

Figure 4- *The most difficult parts of the system for users to use*

These findings clearly indicate the need for greater focus on mobile optimization and improved system stability. At the same time, the level of teacher satisfaction with the available functionalities shows that Loomen generally fulfills its intended purpose but requires further adjustments to enhance student motivation and the overall efficiency of use.

Suggestions for Improvement

Based on the collected results and user feedback, several concrete recommendations for improving the Loomen platform can be identified (Figure 5):

- **Redesign of the user interface** – The platform layout should be simplified, allowing personalization options (e.g., topic filtering, highlighting deadlines, visually marking submitted assignments) and improved navigation. This would enhance clarity and increase student motivation to use the system.
- **Enhancement of the mobile version** – The mobile application should be as functional as the desktop version, with optimized loading speed, better responsiveness, and improved screen adaptation. Students noted that such an upgrade would significantly increase the frequency of platform use.
- **Improved system stability and reliability** – Better server optimization and technical support during peak loads would reduce user frustration and increase trust in the system.
- **Development of a self-assessment module** – Introducing options for quick, anonymous knowledge checks (mini-quizzes, self-assessment after lessons) would promote independent learning and enhance the platform's pedagogical value.
- **Greater use of multimedia content** – Teachers should be encouraged to integrate interactive materials (videos, H5P content, virtual simulations). Training sessions and workshops could help strengthen their digital competencies.
- **Improved communication tools** – Implementing more modern communication features, such as group chats, push notifications, and simplified messaging, would foster greater collaboration and faster information exchange.

These recommendations show that Loomen already possesses all the essential technical prerequisites for effective e-learning, but the system still needs to be further adapted to the habits of today's students and the demands of modern education. Increasing interactivity, simplicity, and technical stability are key steps toward transforming Loomen from

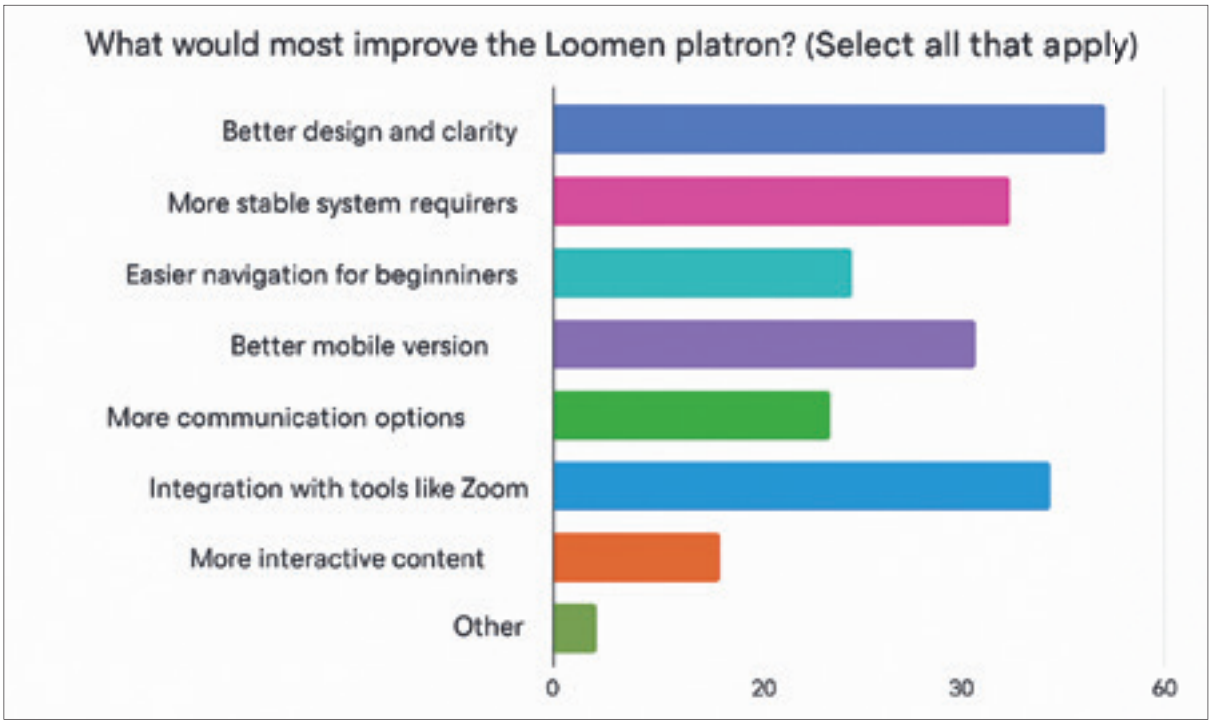

Figure 5- *Suggestions for improving the Loomen platform*

a functional platform into a fully integrated digital learning environment.

Discussion

Analysis of the collected data on the use of the Loomen platform provided a clearer picture of how students and teachers perceive this tool and how they use it in everyday educational practice. Although the results show that most users regularly use Loomen and find it useful, the experiences are mixed—technical reliability and pedagogical effectiveness are not always perceived in the same way. The platform is technically functional, but its pedagogical value depends on how it is implemented, the teachers' digital literacy, and the students' motivation.

During my internship at a secondary school, I had the opportunity to work as a teacher using the Loomen system, preparing teaching materials and monitoring student activities. This experience allowed me to view the research results not only through numbers but also through real classroom situations. I was able to observe firsthand the difference between the theoretical possibilities of the system and the way it is actually used in practice.

The greatest advantage of Loomen remains its accessibility and flexibility. Students can complete assignments outside of the classroom, often late in the evening or on weekends, which is particularly useful for those who learn at their own pace or wish to make up missed lessons. This flexibility has proven to be a key motivational factor—students report that the ability to "learn whenever they want" gives them a sense of control over their own learning. This confirms the view of Garrison and Anderson (2003) that learner autonomy is a fundamental component of successful e-learning.

On the other hand, discussions with teachers revealed that technical reliability is one of the biggest challenges. Teachers often express frustration with occasional login difficulties, slow page loading, or system crashes during exam periods. These issues affect not only the technical delivery of lessons but also the overall perception of the reliability of digital tools. When the system fails at critical moments, user trust diminishes, which can reduce teachers' willingness to adopt digital innovations.

A particularly interesting observation concerns the type and format of learning materials. Students greatly value lessons that include videos, interactive quizzes, images, and practical examples compared to traditional text-based documents. During my teaching experience, I noticed that engagement levels were

significantly higher with multimedia content: students responded faster, participated more actively in discussions, and were more likely to complete their assignments. These findings confirm [6] principles of multimedia learning, which suggest that the combination of text, visuals, and audio enhances cognitive engagement.

Pedagogical analysis also indicates that Loomen provides a solid framework for formative assessment, but its potential is not fully utilized. Teachers rarely use automatic grading and feedback features, even though these tools can encourage continuous learning and self-assessment. Introducing modules for self-evaluation and "mini-tests" without grades could create a more supportive environment where students monitor their progress without fear of making mistakes. Such features contribute to the development of self-regulated learning, which is considered one of the key goals of digital education according to modern pedagogical models.

From a technical perspective, it is clear that Loomen, as Croatia's implementation of Moodle, has a strong and stable open-source architecture. However, technical stability alone is not sufficient without continuous updates and optimization. In practice, most issues occur during periods of intensive use (exam weeks, end of semester), when the system slows down or becomes temporarily unavailable. This points to the need for better resource management and ongoing technical monitoring, as well as for strengthening user support to resolve issues more efficiently.

From a user experience (UX/UI) standpoint, both students and teachers notice that the interface is not sufficiently intuitive or modern. Most users describe Loomen as functional but "outdated" and "overly complex." Compared with tools such as Google Classroom or Microsoft Teams, Loomen appears technically more complex but less visually accessible. Google Classroom stands out for its simplicity and clarity, while Teams provides an integrated environment with instant notifications and chat. Loomen, while maintaining its flexibility, could benefit greatly from adopting a more modern, responsive design with clear icons, personalization options, and shorter navigation paths to key functions.

The pedagogical effectiveness of the platform also depends on how teachers design their activities. The system itself cannot ensure quality learning if it is not used in a didactically meaningful way. Teachers need to be familiar with active and constructivist learning methods, where students are not passive recipients of information but active participants in the learning process. In this regard, CARNET, as the system provider, could develop educational programs to help teachers fully utilize the potential of Loomen—not only as a repository for files but as a digital space for exploration, collaboration, and reflection.

When compared with other LMS solutions such as Moodle, Microsoft Teams, and Edmodo, Loomen shares many functionalities but differs in terms of local adaptation and accessibility. Teams, for example, is strongly integrated with the Office suite and enables synchronous communication, while Moodle (and Loomen) focuses more on asynchronous learning and detailed progress tracking. Edmodo, on the other hand, emphasizes simplicity and social interaction but offers less control. This comparison shows that Loomen occupies a middle ground—it has a strong structure and control but could benefit from greater intuitiveness and aesthetic appeal.

Within the context of the Croatian educational system, Loomen holds additional value because it is free, nationally supported, and integrated with e-Matica and e-Dnevnik, which gives it a significant institutional advantage. However, technological capabilities and pedagogical potential must remain balanced. If students do not perceive the platform as engaging and useful, its technical complexity loses its purpose.

As a future teacher and system user, I believe that integrating a modern design, ensuring greater stability, and diversifying teaching materials could make Loomen more effective. This would not only improve user satisfaction but also foster higher student motivation, better interaction, and more successful knowledge acquisition. E-learning would thus become not merely an emergency alternative but an equally valuable and desirable method of education in the digital age.

CONCLUSION

The conducted research provided a comprehensive insight into the current state of the Loomen platform and the experiences of its users. Based on the collected data, surveys, and personal experience during teaching practice, it became clear that Loomen

has become an indispensable tool in the modern educational system of the Republic of Croatia, especially in the context of distance and hybrid learning models. This confirms the findings of [1], which emphasize the importance of e-learning and LMS platforms in increasing access to educational materials and creating a more inclusive learning environment.

Its core functionalities—access to learning materials, test creation and administration, and communication through forums—have been well received by both students and teachers. The platform largely fulfills its primary purpose: digitally connecting all participants in the educational process and ensuring continuity of teaching regardless of time and place constraints. This is consistent with [5], who highlight that the basic functionalities of LMS platforms are the foundation of pedagogically effective and sustainable e-learning systems.

However, numerous comments and survey results indicate that the system still has significant room for improvement. The main hypothesis of this research—that improving the user interface increases student efficiency and satisfaction—was confirmed through both quantitative data and practical experience. Students and teachers almost unanimously emphasize the need for a simpler, clearer, and more intuitive interface that allows faster navigation and reduces frustration during use. This conclusion aligns with [3], who note that a well-designed interface directly influences learner motivation, engagement, and autonomy.

In the modern educational context, design is not merely an aesthetic but also a pedagogical category—an intuitive interface encourages activity, while a complex or outdated one diminishes concentration and interest.

The secondary hypothesis regarding the importance of self-assessment modules was also confirmed by the research results. Students expressed a strong desire for the ability to independently check their knowledge, which would allow them to track progress without the pressure of formal grading. This would help develop key competencies such as self-regulation, responsibility, and self-motivation. These results are consistent with [2], who emphasize the importance of interactive and self-directed learning in digital environments. Introducing such modules would not only increase the pedagogical value of Loomen but also contribute to a broader goal—the development of students who take an active role in their own education.

The third hypothesis, relating to system stability and mobile optimization, emerged as the most significant user demand. A large number of students reported that technical difficulties—such as slow loading, login problems, and poor mobile performance—significantly hinder their use of the platform. This supports the conclusions of [3], which underline that technical reliability and mobile accessibility are key factors of user experience in any LMS system. In today's context, where most students use smartphones as their primary learning device, optimizing the mobile version is no longer optional but essential.

The analysis conducted in this study also showed that technical solutions, regardless of how advanced they are, are insufficient without pedagogical understanding and user-centered design. An e-learning system must be designed to foster interaction, collaboration, and reflection—three key elements of effective digital pedagogy. In this sense, Loomen holds significant potential, but continued development is needed in three key areas:

- **Technical stability** – system optimization, improved user support, and continuous functionality testing.
- **Pedagogical innovation** – development of teachers' digital competencies and encouragement of interactive and multimedia content.
- **User experience (UX/UI)** – modernization of the interface, visual clarity, and intuitive navigation.

Implementing the proposed improvements would have multiple benefits. On one hand, technical barriers would be reduced and teacher efficiency increased, while on the other, students would gain a more motivating and interactive learning environment. This would create conditions for deeper understanding of learning content, the development of critical thinking, and greater satisfaction with the learning process.

These conclusions extend beyond Loomen itself to the broader understanding of digital transformation in Croatian education. In recent years, especially after the COVID-19 pandemic, it has become evident that digital solutions are no longer an addition but an integral part of the education system. As a national plat-

form, Loomen symbolizes this shift but also carries a responsibility—to continue evolving in line with the needs of new generations of students and teachers.

From a pedagogical perspective, this research confirms that technology alone does not create learning—it occurs through meaningfully designed activities, supportive interfaces, and stimulating environments. Therefore, future research should focus not only on the system's technical development but also on monitoring the effects of new functionalities on actual learning outcomes. It is recommended to conduct pilot projects that include a modernized interface, enhanced communication tools, and self-assessment modules, accompanied by systematic tracking of their impact on student motivation and achievement over time.

Loomen already plays a key role in Croatia's educational landscape. Its future development should be guided by the principles of simplicity, interactivity, and accessibility, so that the platform becomes not only a functional tool but also an inspiring digital environment that motivates students and supports teachers.

Ultimately, it can be concluded that Loomen is not merely a technical system but a **pedagogical bridge** between traditional and digital schooling. If the recommended improvements are implemented, the platform could become a model of effective e-learning—one that goes beyond necessity and establishes itself as a standard of quality education in the 21st century.

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ABOUT THE AUTHORS

Karlo Čuković-Tkalčec (1991, Koprivnica) graduated from Fran Galović Gymnasium, where he actively participated in field-teaching projects and extracurricular activities, independently producing video recordings and film editing for school presentations. After completing vocational retraining, he obtained an instructor's license and worked for five years as a driving instructor. In 2020, he enrolled at the Pan-European University Apeiron, where he completed the first cycle of teacher-training studies in informatics in 2023 (180 ECTS), followed by the first cycle of academic studies in computer science and informatics in 2024 (240 ECTS), graduating with excellent results; he is currently completing a second-cycle master's program (300 ECTS). From an early age, he has been developing strong computer-related skills, which he further enhanced through his studies and professional practice at the gymnasium by creating teaching materials, presentations, quizzes, and exams, and by working directly with students. In addition to his work in a driving school, he has held various occasional jobs in production facilities and forest maintenance. Since September 2025, he has been employed as a mathematics teacher at Koprivnički Bregi Elementary School and at Molve Elementary School.

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