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Author(s): Bizhanov, Nurzhan; Manarbek, Gulden; Shaikh, Aijaz

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N.N. Bizhanov¹ , G.M. Manarbek^{1*} ,
Aijaz A. Shaikh² 

¹Al-Farabi Kazakh National University, Almaty, Kazakhstan

²University of Jyväskylä, Jyväskylä, Finland

*e-mail: gulden.manarbek@kaznu.edu.kz

EXPLORING THE USE OF LEARNING MANAGEMENT SYSTEM AS AN EFFECTIVE TOOL FOR QUALITY MANAGEMENT OF VOCATIONAL EDUCATION

This study aims to investigate the functional capabilities of the learning management system (LMS) as an effective tool for quality management in technical and vocational education, allowing for the analysis of the current situation and assessment of the effectiveness of work at all levels. This study has significant theoretical and practical value for deepening and expanding the theory of quality assessment in technical and vocational education and the management system, as well as for the development of scientific, standardized and adaptive systems and models in the future. This study aims to highlight the significance of an integrated model of various information systems' success in using LMS in technical and vocational education (TVE) institutions. The work also provides a comparative analysis of the features of using LMS in secondary and higher education institutions and TVE. Thus, this study identifies promising areas for further analysis and scientific research, providing valuable information on the use of LMS in the context of TVE. In addition, the study reveals new factors influencing the effectiveness of LMS in TVE institutions.

Key words: technical and vocational education, quality management, learning management system.

Н.Н. Бижанов¹, Г.М. Манарбек^{1*}, Айжаз А. Шайх²

¹ Әл-Фараби атындағы Қазақ ұлттық университеті, Алматы қ., Қазақстан

² Ювяскюля университеті, Ювяскюля қ., Финляндия

*e-mail: gulden.manarbek@kaznu.edu.kz

Кәсіптік білім беруді басқару үшін тиімді құрал ретінде оқытуды басқару жүйесін қолдануды зерттеу

Бұл зерттеудің мақсаты ағымдағы жағдайды талдауға және барлық деңгейдегі жұмыстардың тиімділігін бағалауға мүмкіндік беретін техникалық және кәсіптік білім беру сапасын басқарудың тиімді құралы ретінде оқытуды басқару жүйесінің (ОБЖ) қажетті функционалдығын зерттеу болып табылады. Бұл зерттеудің техникалық және кәсіптік білім беру мен басқару жүйелерінің сапасын бағалау теориясын тереңдету және кеңейту, сондай-ақ болашақта ғылыми, стандартталған және бейімделген жүйелер мен үлгілерді әзірлеу үшін маңызды теориялық және практикалық маңызы бар. Бұл зерттеу техникалық және кәсіптік білім беру (ТЖКБ) мекемелерінде ОБЖ қолданудағы әртүрлі ақпараттық жүйелердің табыстылығының интеграцияланған моделінің маңыздылығын көрсетуге бағытталған. Жұмыста сонымен қатар орта және жоғары оқу орындары мен ТЖКБ мекемелерінде ОБЖ қолдану ерекшеліктеріне салыстырмалы талдау жасалған. Осылайша, бұл зерттеу ТЖКБ контекстінде ОБЖ қолдану туралы құнды ақпарат бере отырып, одан әрі талдау мен зерттеудің перспективалық бағыттарын анықтайды. Сонымен қатар, зерттеу ТЖКБ оқу орындарындағы ОБЖ қолдану тиімділігіне әсер ететін жаңа факторларды анықтайды.

Түйін сөздер: техникалық және кәсіптік білім беру, сапа менеджменті, оқытуды басқару жүйесі.

Н.Н. Бижанов¹, Г.М. Манарбек^{1*}, Айжаз А. Шайх²

Н.Н. Бижанов¹, Г.М. Манарбек^{1*}, Айжаз А. Шайх²

¹Казахский национальный университет имени аль-Фараби, г. Алматы, Казахстан

²Университет Ювяскюля, г. Ювяскюля, Финляндия

*e-mail: gulden.manarbek@kaznu.edu.kz

Изучение использования системы управления обучением как эффективного инструмента для управления качеством профессионального образования

Целью данного исследования является изучение необходимых функциональных возможностей системы управления обучением (СУО), в качестве эффективного инструмента управления качеством технического и профессионального образования, который позволит проводить анализ сложившейся ситуации и оценить эффективность работы на всех уровнях.

Данное исследование имеет значительную теоретическую и практическую ценность для углубления и расширения теории оценки качества технического и профессионального образования и системы управления, а также для разработки научных, стандартизированных и адаптивных систем и моделей в будущем. Целью данного исследования является выявление значимости комплексной модели успеха различных информационных систем при использовании систем управления обучением в учреждениях технического и профессионального образования (ТПО). В работе также проводится сравнительный анализ особенностей использования СУО в учреждениях среднего и высшего образования и ТПО. Таким образом, данное исследование определяет перспективные направления для дальнейших анализов и научных изысканий, предоставляя ценную информацию о применении СУО в контексте ТПО. Кроме того, исследование выявляет новые факторы, влияющие на эффективность СУО в учреждениях ТПО.

Ключевые слова: техническое и профессиональное образование, управление качеством, система управления обучением.

Introduction

The enhancement of education quality is one of the key directions in the development of the global system of vocational education. A critical strategic objective of the reform of vocational education in Kazakhstan is to establish a comprehensive system and model for quality assessment that aligns with the evolving demands of the contemporary vocational training system within the country. Internationally, there has been a noticeable expansion in the scope of vocational education, with various countries and regions exhibiting diverse volumes and rates of development, influenced by their macro-political situations, stages of economic growth, changes in labour market structure, and informatisation levels. According to the «Global Vocational Education Industry Development Report 2023», published by Ariadne Consulting in November 2023, despite the repercussions of the global COVID-19 pandemic, political instability in several nations, and extreme natural disasters that have adversely affected the global economy, the international market for vocational education is expected to continue expanding, surpassing USD 1,195,337 million by 2028, driven by positive trends in the advancement of global vocational education (Research Consulting, 2023).

In 2022, Kazakhstan's vocational education system produced 146,500 highly qualified workers and technical specialists for various sectors across

724 colleges. Of the 2022 graduates, 63.3% were employed, while 12.1% pursued further education. The effective quality assessment system for vocational education is the primary factor contributing to successful vocational training and significant impact on employment. Currently, a key focus for Kazakhstan is the transformation of vocational education organization methods and the development of a quality assessment model that integrates national characteristics with international standards. However, during the reform and development of technical and vocational education (TVE), Kazakhstan faces several challenges associated with the impacts of international economic transformation and industrial digitalization. These challenges include insufficient efficacy of government agencies in implementing policy, a lack of effective collaboration mechanisms between colleges and industrial enterprises, and low public appeal of vocational education.

In 2021-2022, the number of students opting for secondary vocational education in Kazakhstan's cities totalled 11,193 in Almaty, 4,304 in Astana, and 6,563 in Shymkent, with 81, 31, and 39 colleges operating in these cities, respectively. In the regions, the highest number of students were registered in the Karaganda region (6,464 students across 63 colleges) and the North Kazakhstan region (2,000 students across 23 colleges) (National Statistics Bureau, 2022). These figures are significantly lower than those in OECD countries, where the proportion

of students choosing vocational education in upper secondary education exceeds 40% (OECD, 2024). Addressing these challenges necessitates broader societal attention to improving the quality of vocational education, and a scientifically grounded quality assessment model may serve as a pivotal factor in enhancing the effectiveness of the vocational training system.

The purpose of this study is to investigate the functional capabilities of LMS as effective tools for quality management in TVE. We also aim to identify unique functionalities for future LMS, applicable in vocational education.

Based on the research objectives, the following research questions are proposed:

RQ1: Determine the depth of study on the issue of using LMS in technical and vocational education based on a literature review?

RQ2: Determine the practical significance of LMS to ensure quality improvement of vocational education.

RQ3: identify the key functionalities of LMS to be effective in quality management practices of TVE institutions?

Literature review

Globalization, along with the active implementation and practical application of new technologies across various sectors of the economy and society, significantly transforms the education system as a whole. A key resource commonly employed in the educational process is the Learning Management System (LMS). This system includes a range of tools for overseeing and managing both teaching and learning activities (Alawamreh, 2015). LMSs are generally proceed within the educational process, allowing educators to create and distribute needed materials, evaluate and track student performance. (Mital, et al., 2021). In Western literature, the first learning management system is considered to be PLATO (Program Logic for Automatic Teaching Operations), which was developed in 1960 at the University of Illinois at Urbana-Champaign (USA) (Stommel, 2012). The project has undergone several updates and has been implemented in various colleges and universities worldwide. Today's popular LMS platforms are Canvas, ISpring, Schoology and Google Classroom. Each system has its distinct advantages and disadvantages, which depends on the software's design for specific purposes. According to research conducted by MarketsandMarkets.com, the LMS market is projected to be USD 37.9 billion by 2026 (Markets and Markets, 2022). This ex-

pansion can be linked to the extensive integration of cloud technologies in learning management systems, which plays a significant role in the growth of the LMS market. In addition, there is a comparative study, that emphasizes the benefits of LMS, in particular LMS Moodle to arrange e-learning, conduct lessons in electronic classrooms, take online courses, and conduct synchronous and asynchronous learning in a virtual educational environment from higher education institutions in Kazakhstan and Slovenia (Nurassyl, K., et al., 2019). The effectiveness of LMS in increasing quality control in technical and professional education in Kazakhstan drew significant attention. Several studies highlight the peculiarities of quality management systems in educational institutions (Jumasheva et al., 2018) and the complex legal structures that influence education management (Movkebayeva et al., 2021). Comparative analyses reveal crucial factors in training managers (Kusanov et al., 2021) and the importance of quality management in student capital promotion (Nagymzhanova et al., 2018). In addition, LMS platforms such as Moodle facilitate distance education (Kerimbayev et al., 2017), while modernization processes in educational programs serve as vital quality warranty tools (Manarbek et al., 2019). However, challenges remain in implementing intelligent management systems (Seitbatkalova et al., 2023). This dynamic scenario highlights the need to improve continuous quality in the Kazakhstan Vocational Education sector (Baitanayeva et al., 2020) amid evolving digital education trends and quality assurance issues (Kerimkulova, 2017; Shaoreva et al., 2022).

The learning management system enhances student engagement in the educational process by providing forums and chat features as a means of communication. Within these functional capabilities, educators and learners are enabled to engage in synchronous discussions and dialogues. These approaches promote the exchange of information, the generation of ideas, and the acquisition of feedback within the realm of technical and vocational education. The Learning Management System (LMS) specifically facilitates the educational process on a unified platform. Educators have the ability to assess student performance directly within this system. Furthermore, the LMS encourages collaboration among students, educators, and institutions, with the objective of achieving educational goals and improving the overall quality of teaching and learning. This collaborative environment ultimately enhances employability prospects and increases the demand for graduates in technical and vocational education

(Nor, 2023). The focus on employers as the ultimate beneficiaries should serve as a central starting point for revising and enhancing the vocational education system.

User acceptance of the characteristics of LMSs is sometimes viewed as a significant factor influencing the challenges of their implementation. According to Mason, R. B. (2018), a comprehensive analysis of both the system itself and the personnel involved contributes to quality enhancement in vocational education institutions. The success of a technology encompasses both technical and non-technical components. In the context of this literature review and the testing of various systems, functional features influencing ease of use, perceived usefulness, and user satisfaction, as well as intention and actual use of the technology, were examined.

According to findings of Nafsaniath (2020) universities primarily assess the efficacy of LMS and perform evaluations of faculty needs concerning LMS functionalities. They also deliver both foundational and advanced training for educators, along with providing professional development tailored to specific disciplines regarding the application of LMS.

There are two main factors that motivate the usage, which are internal and external, according to Mitchell (2020). He rises the theme of gamification of the process, which undoubtedly is very crucial theme to be discussed, and to be integrated as a part of LMS. In the same manner, there is a supporting study, which discusses the key factors that define students' behavioral intention to understand and use LMS. The findings of the research revealed that performance expectancy, effort expectancy, social influence and facilitating conditions as the most important influencing factors for students to use LMS (Özkan, et al., 2020).

The success of an information system is closely tied to the process of user acceptance. This research aims to identify the key features that ensure the successful implementation and utilization of LMSs in TVE institutions. Indeed, the research studies have already emphasized the positive impact of LMS use in the educartional process to ensure quality of education and to enhance student satisfaction (Rabimian, et al., 2020).

Methodology

The current paper studied the existing literature discussions and arguments on the importance of rising technology benefits applicable in vocational education to back up the practical experience and pro-

fessional expertise of authors. As the basis for the literature review to conduct the content-based analysis, the well-known Web of Science database was employed. The keywords "Learning Management system" and "Vocational education" have been entered. As a result, as many as 40 articles have been obtained from Web of Science Core Collection. The first study discussing the use of LMS in vocational education, particularly, the case of Bergen University College, which reformed its educational methods by implementing Problem-Based Learning (PBL) and project-organized learning, collaborating with vocational schools to enhance students' skills, and using a Learning Management System (LMS) to facilitate interdisciplinary problem-solving, dated to 2004. Thus, our literature review covered the period between 2004 and 2024. Following, the current paper refined the search to research articles, by eliminating conference papers, which revealed only 15 articles. The findings highlight a lack of discussion and research on the role and impact of LMS in vocational education, making the current paper particularly significant. Consequently, this approach facilitates a deeper understanding and analysis of issues arising in technical and vocational education (TVE). In the same manner, the method relies on the authors' practical experience in quality education management and involves data collection regarding issues through observation, document analysis, reports, and other materials to study factors leading to problems, such as lack of knowledge, poor organization, and external conditions. Additionally, the research examines theoretical approaches, concepts, and models within the realm of vocational education. Based on the analysis of problems and their causes, this study proposes recommendations for their resolution.

Results and Discussion

Faced with challenges in student enrollment and public perception, which is shaped by skepticism among the Kazakh population regarding vocational education, there is a pressing need for significant reinforcement and transformation of the vocational education system in Kazakhstan, emphasizing systematic quality improvement. This understanding is reflected in the president's statements about the progress made in reforming the educational sector. However, several unresolved issues require attention. A key challenge is reducing inequality in education quality among different social groups and regions (Events, 2021). In a broader context, the development of quality education is linked to the prep-

aration of highly qualified personnel, the development of effective curricula, and the organization of professional conditions, particularly in establishing practical training bases. As Kazakhstan undergoes industrial transformation, the preparation of specialists must be aligned with the anticipated needs of the labour market. In this regard, institutions of technical and vocational education must evolve into primary centres for professional self-actualization for youth, offering diverse educational services with flexible learning formats, including short-term training, by the concept for the development of vocational education in Kazakhstan for 2023-2029 (Government Resolution of Kazakhstan, 2023). The quality assurance system should be one of the primary tools in realizing set objectives, measuring the effectiveness of vocational education and fostering public trust in this sector of the educational system.

The quality of college graduates is often perceived as “low” due to a three-year training period following the completion of the 9th grade and a two-year period after the 11th grade, which is significantly shorter than in Kazakhstan’s universities. When enrolling students after the 9th grade, one year of study is dedicated to the 10th and 11th-grade curriculum. As a result, students have only two academic years dedicated to vocational training and the development of practical skills (Order of the Minister of Education of Kazakhstan, 2022). The need for a quality assurance system in education, especially in vocational training, is backed by govern-

ment regulations, including the accreditation of colleges, which is carried out by the education control department every five years. (Law on Education of Kazakhstan, 2007). A second instrument introduced in 2022 is a monitoring system – registration of educational programmes (Order of the Acting Minister of Education of Kazakhstan, 2022). The responsibility for monitoring and maintaining the register has been assigned to the non-profit joint-stock company “Talap” under the Ministry of Education of Kazakhstan. The mission of this organization is to create and implement innovative approaches that enhance the quality of education and workforce training while actively participating in international initiatives such as WorldSkills International (WSI) (talap.edu.kz). While these measures are appropriate for establishing a quality assurance system in vocational education, key issues remain in control mechanisms, guidelines, and a unified approach to assessment and compliance, particularly concerning educational programmes. It is also essential to consider the corruption risks; according to the global anti-corruption movement Transparency International, Kazakhstan ranks among the highly corrupt countries, scoring 39 out of 100 (97th place out of 180 countries) (Corruption Perception Index, 2023).

The findings of the literature review have been arranged in a way to demonstrate the key message of the research, the region and the main findings of the refined studies. The graphical illustration of the content analysis is provided in Table 1.

Table 1 – The content analysis of research papers

№	Authors	Analysis of content	Research findings
1	Ahmad, N.A., et al., (2023)	to explore the reasons behind the differences in LMS usage between TVET and non-TVET institutions in Malaysia.	New factors, such as System Quality, User Satisfaction and Actual Use have been identified to enhance LMS acceptance in TVET institutions.
2	Edeh, N.I., et al., (2021)	to explore expanding the Technology Acceptance Model (TAM) to better understand LMS adoption in Technical and Vocational Education and Training (TVET) institutions in Nigeria.	The study found that vocational educators view LMS as a reliable ICT tool that supports TVET teaching and enhances skill transfer to students. Path analysis revealed that lecturers’ characteristics, such as experience and gender, fully mediate the relationship between LMS skills and the extent of LMS usage.
3	Ozkan, U.B., et al., (2020)	to explore the factors that influence students’ behavioral intention to use LMS in Turkey colleges.	The study found that performance expectancy, effort expectancy, social influence, and facilitating conditions are key predictors of students’ behavioral intention to use LMS.
4	Cigdem, H. and Topcu, A., (2015)	to explore instructors’ behavioral intention to use Learning Management Systems (LMS) at the postsecondary military vocational college level.	The research identified several factors influencing LMS usage, including perceived ease of use, perceived usefulness, behavioral intention, application self-efficacy, technological complexity, and subjective norm. It also incorporated external variables such as instructors’ age, prior teaching experience, and course relevance.

Continuation of the table

№	Authors	Analysis of content	Research findings
5	Kerimbayev, N, et al., (2020)	to explore the introduction of a virtual educational environment using the LMS Moodle, examining its impact on the interactive engagement between students and teachers at universities in Kazakhstan and Slovakia.	Findings demonstrate how the LMS Moodle platform facilitates e-learning, enables lessons in virtual classrooms, supports online courses, and accommodates both synchronous and asynchronous learning.
6	Mahat, et al., (2024)	to explore the factors affecting the quality of LMS use, focusing on three key dimensions: information quality, system quality, and service quality.	The findings revealed that compatibility, subjective norm, and technological complexity significantly impact both perceived usefulness and perceived ease of LMS use.
7	Cigdem, H. and Oncu, S., (2024)	to examine the impact of self-regulated learning (SRL) skills on the academic success of non-commissioned officer (NCO) students in a government-affiliated Special Vocational College (SVC).	The findings revealed that students' perceptions of interactivity in the learning environment (ILE) and their perceived self-efficacy (PSE) positively and significantly influenced their perceived satisfaction (PS) and significantly impacted the perceived usefulness (PU) of LMS. The practical implications of these findings highlight how LMS administrators can help support students in blended courses by fostering the development of self-regulated learning (SRL) skills.
8	Munyaradzi, M., (2024)	to explore the readiness of lecturers in South Africa to use an institutionally-designed Learning Management System (LMS) to engage their students in learning.	The study revealed that participants were largely unprepared to use the LMS for teaching, citing factors such as poor system design, lack of user expertise, and inadequate technological resources for both lecturers and students. The findings indicate that the LMS requires upgrades to enhance its effectiveness for online teaching, and recommend that the college secure lecturers' buy-in by offering additional training on the system's use.
9	Sadowski, C., et al., (2017)	to explore how higher education students at a regional Australian dual-sector institute use and manage social networking sites (SNSs) for personal and study-related activities.	Through thematic analysis, four key themes were identified: SNSs as a tool for fostering peer connectedness among students; a clear distinction between personal and educational use of SNSs; resistance to integrating external SNSs within educational settings; and the need for a balance between digital and face-to-face learning and connectivity.
10	Elmunsyah, H, et al., (2023)	to assess the success of learning management systems using a modified version of the DeLone and McLean model.	The results of the nine proposed hypotheses revealed that two had an insignificant relationship: information quality on user satisfaction and system quality on use. These findings suggest that the proposed model offers an alternative perspective for evaluating LMS effectiveness.
11	Van Elsen, S., et al., (2024)	to explore the leisure motivations of secondary school pupils aged 14-18 in Flanders (Belgium) and examine how these motivations relate to their socioeconomic and sociocultural characteristics.	The results suggest that the LMS may not fully address the leisure motivations of certain adolescent subgroups. These findings emphasize the need to recognize the diversity of youth leisure motivations and highlight the importance of tailored policy interventions that focus on adolescents' aspirations and experiences, ensuring equitable access to meaningful leisure opportunities.
12	Tovstokoryi, O.M., and Popova, G.V., (2021)	to highlight key aspects of implementing a competence-based approach in the training of future ship's commanding officers.	The article compares traditional education with training using virtual reality simulation technologies, concluding that simulation technologies are effectively integrated into the educational process. It also introduces an e-learning system based on LMS Moodle to provide IT support and training for future ship navigators.
13	Adamec, P.M and Simane, M., (2021)	to examine online learning during the COVID-19 pandemic.	Research identified capturing, describing, and interpreting students' perceptions of online learning using MS Teams and LMS Moodle.

Continuation of the table

№	Authors	Analysis of content	Research findings
14	Cigdem, H and Ozturk, M., (2016)	to examine the predictors of students' behavioral intention to use LMSs at a two-year post-secondary military school in Turkey by applying a three-tier use model.	The results revealed that multimedia instruction directly influenced both perceived usefulness and perceived ease of use, while interactivity had a direct impact only on perceived satisfaction.
15	Masek, A., (2021)	to identify the most preferred digital pedagogical tools for teaching and learning among Technical and Vocational Education and Training (TVET) lecturers in Malaysia and Indonesia.	The results indicated that lecturers in both countries showed similarities in using digital pedagogical tools, particularly for communication, collaboration, and assessment and differences, particularly preferences for content delivery, with Malaysian lecturers favoring document management tools, while Indonesian lecturers preferred using the university-provided Learning Management System (LMS) in the TVET teaching and learning process.
Note – complied by authors			

Given these facts, developing a Learning Management System (LMS) in vocational education is required to enhance the training of specialists and be a significant manifestation of society's commitment to high-quality education, which warrants special attention. Ensuring a high level of development in vocational education is linked not only to the existence and growth of educational institutions but also impacts the overall advancement of Kazakhstan's education system, its economic and social development, and the formation of a favourable social environment. The head of state in his message emphasized that "...educational institutions of technical and vocational education need to align with the real needs of the labour market and meet the goals of the new economic course of the country. It is necessary to build constructive partnerships with parents and students, who must take their share of responsibility for the quality and relevance of the knowledge and skills they acquire" (Message from the Head of State, 2024).

An example of successful and widespread implementation of LMS at the secondary education level in Kazakhstan is the "Automated Information System Project for Electronic Journals and Diaries 'Kundelik,'" launched in 2016, which encompasses over 6,000 schools, with daily active users numbering around 90,000 (Ilyasov, 2017). The utilization of Learning Management Systems (LMS) in higher education institutions in Kazakhstan has its origins in the early 2000s. This represents an instance where innovative teaching approaches and practices are employed in conjunction with advancements in technology. Such a strategy allows students to actively participate in the creation of an information society

and enhances online education at both traditional and technical levels within educational institutions. Emotional bonds are established as learners engage with one another, contributing to the formation of an online learning community where participants feel secure in their involvement. These emotional connections facilitate collaborative efforts, which can enhance the sharing of assignment-related information, thereby potentially leading to improved student learning outcomes (2021). A notable example is the "Univer" system, implemented at al-Farabi Kazakh National University, which facilitates effective interaction at all levels of the educational process and provides access to both internal and external oversight. Importantly, this system is characterised by its transparency, which also aids in mitigating corruption risks. It should be noted that prior experience has a significant positive effect on consumers of LMS. Users with more experience in working with LMS use the system significantly more than the those who has less experience.

The necessity for the development and implementation of an LMS as an effective tool in quality management within technical and vocational education (TVE) is obvious. This system can be developed as a standardized tool for all technical and vocational education institutions, similar to those used in secondary education, or as a customized platform like in universities. The differences in the application of various LMS approaches in secondary and higher education are due to the distinct standards and methodologies employed in each. Specifically, the school curriculum is uniform across Kazakhstan, while educational programmes at universities vary, guided by the specifics of each speciality and aca-

democratic freedom. TVE includes two components in the educational curriculum: first, general education subjects encompassing the 10th and 11th grades – thus remaining unchanged; and second, specialised subjects that depend on the particular educational program's specialisation. In the latter case, institutions of TVE, like universities, are governed by academic freedom (Order of the Minister of Education of Kazakhstan, 2022). Downes and Bishop (2015) indicated that one-to-one computing, coupled with comprehensive guidelines for consistent student training, facilitates the effective execution of the curriculum through the utilization of LMS resources. In educational contexts, the integration of pedagogy and content knowledge with technology should align with instructional strategies, collaborative practices, and leadership approaches that engage active learners and address their aspirations for adaptive, technology-enriched educational environments.

The primary impetus for the adoption of LMS in TVE in Kazakhstan arose during the COVID-19 pandemic when all colleges in the country were compelled to transition to online education in 2020 (Order of the Minister of Education and Science of Kazakhstan, 2020). The technical and vocational education sector was wholly unprepared for this task in the initial phases, as administrative and teaching staff lacked the necessary competencies, effective tools had not been introduced, and there were insufficient technical capabilities. The LMS available on the market did not consistently meet the needs of TVE, as they had primarily focused on universities and schools prior to this period. The emergency adaptation to address TVE requirements also led to systemic errors and failures. Consequently, the educational process occurred across various platforms that were not specialised for educational purposes but were convenient for use by the general public and were intuitive and rapidly adaptable to the situation, including platforms such as WhatsApp, Discord, Zoom, and others. Managing the situation was practically impossible, leading to multiple increases in labour costs and resulting not only in financial losses but also in a decline in quality metrics.

As of today, many systems have adapted to the needs of TVE, incorporating both domestic and foreign developments. A major issue remains the absence of regulatory documents, standards, and requirements for these types of programmes and systems. Many technical and vocational education institutions still conduct their documentation entirely in paper format while utilizing messaging applications to deliver educational materials and assign-

ments. Managing this system today is impractical and, from a practical standpoint, highly inefficient. Establishing and implementing an LMS would lead to cost optimization, time savings, improved quality control, and comprehensive system analysis and enhancement.

Satisfaction can be defined as the subjective emotional response, either positive or negative, that an individual experiences as a consequence of evaluating the disparity between anticipated outcomes and actual experiences. Within e-learning contexts, student satisfaction is characterized by the extent to which learners perceive that the Learning Management System (LMS) fulfills their informational requirements (Almarashdeh, 2016). Students typically utilize their level of satisfaction with the LMS as a criterion for assessment; consequently, a heightened level of satisfaction correlates with continued usage of the LMS (Limayem, 2011).

By analyzing various LMS platforms (such as Moodle, iSpring Learn, Google Classroom, Canvas LMS, and Testter.kz) alongside the specific needs of the TVE system, the essential functional capabilities required for effective implementation in the TVE framework have been identified.

According to Maan Ali Alkhateeb (2021) in research of Moodle LMS, the data-derived information demonstrates substantial validity, as the correlation coefficients confirm consistent relationships. The analytical tools effectively generate a comparative framework for assessing a product's relative quality against other offerings, facilitating comprehensive evaluative analyses, particularly in the context of competitive assessments. The findings indicate that a significant proportion of participants expressed satisfaction with the efficiency, aesthetic appeal, and clarity of Moodle. Conversely, the user experience (UX) evaluation of Moodle reveals favorable mean scores regarding clarity and efficiency, alongside an overall positive mean assessment.

Kosareva, L (2021) examined two groups of students – one of them used e-learning platform (iSpring), second took courses in traditional way. Upon the completion of the experiment, all participants were tested and surveyed to assess their perceptions regarding the effectiveness, convenience, and satisfaction associated with the selected learning modality. The study revealed that students in the experimental groups dedicated significantly more time to their learning activities, resulting in enhanced performance outcomes. It was noted that the adaptive learning features of iSpring play a pivotal role in augmenting student performance by facilitating more efficient and accelerated learning processes.

The use of “ISpring” as a learning tool improves student engagement and learning results (Taiyeb, AM, 2017).

The study’s findings of Albashtawi, AH (2020) indicate that Google Classroom enhanced students writing and reading abilities. Regarding Google Classroom’s usability, accessibility, and ease of use, students had favorable opinions about it. Santos, JM (2021) study revealed that teachers came to the conclusion that, despite being a novel experience, using Google Classroom helped them understand how this technology could improve their teaching life.

Schauer L. (2024) in her research of integrating Canvas and GitLab into educational process noted improvement in the overall user experience for both students and teachers, the framework semi-automates feedback loops saves educators up to 16.7 hours of administrative time over the course of a 12-week semester. Shayan P. (2023) compared user acceptance for two LMSs (Blackboard and Canvas). Findings imply that Canvas users are more likely than Blackboard users to accept it at the question and concept levels. Similarly, at the construct level, the descriptive network modeling for Canvas shows

a marginally higher concordance between Canvas users than Blackboard.

Testter.kz is a fully Kazakhstani product that entered the market in 2021. The system has many positive aspects, despite instances of server crashes. The materials for this system are developed and uploaded by a select group of specialists. There is no feature for independent task creation. This system can be considered more of a testing simulator rather than a comprehensive educational management system.

After conducting a literature review and practical examination of various systems, the decision was made to develop a proprietary product that incorporates the best features of different Learning Management Systems (LMS) – unitest.kz. The primary functions found in all currently used LMS were identified as following:

- User Registration and Account Management. This function allows students and instructors to create accounts and log in using personal information or social media accounts. Administrators can manage user access rights (students, instructors, administrators);

The screenshot shows the registration interface for Unitest.KZ. At the top, there is a navigation bar with the logo on the left and 'Language' and 'Already have an account? Enter' on the right. The main heading is 'Registration' in blue. Below it, a message says 'Welcome to Unitest! To register, you need to fill in all the fields.' The form consists of several input fields: 'Name' (a single line), 'Email*' (with 'name@example.com' as a placeholder), 'Telephone*' (with '+7(____) ____' as a placeholder), 'User Type' (a dropdown menu), 'Region' (a dropdown menu), 'School' (a single line), 'Come up with a password*' (with a strength indicator), and 'Confirm the password*' (with a strength indicator). At the bottom, there is a prominent orange button labeled 'Регистрация'. The page is decorated with 3D molecular models on the right side.

Figure 1 – Example of registration and management of user accounts

Note – taken from the website «Modern system of knowledge diagnostics for students and schools»

- Course and Module Creation. This involves the development and structuring of courses composed of multiple modules or lessons. Each course may include theoretical and practical materials, videos, text lectures, and assignments for students. It is important to have the flexibility to configure course

structures (segmentation by topics, weeks, or difficulty levels);

- Interactive Materials and Multimedia Element – support for various material formats including text, video, audio, presentations, and infographics. This feature enables the incorporation of animations,

simulations, games, quizzes, and other multimedia resources to enhance engagement;

- Assessment and Testing – the ability to create various types of tests (multiple-choice, open-ended

questions, matching tasks), as well as automated grading of test results. This function allows for monitoring student progress and providing real-time feedback;

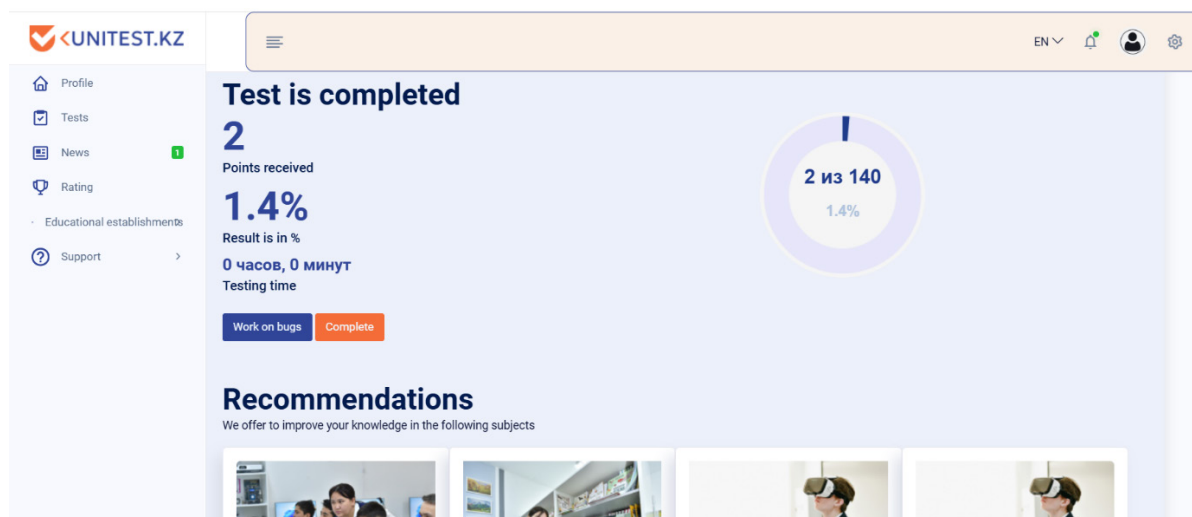


Figure 2 – Example of assessment and testing

Note – taken from the website «Modern system of knowledge diagnostics for students and schools»

- Discussion Forums and Chats – built-in forums and chat functionalities for students and instructors. These facilitate exchanges of opinions, question-asking, and sharing of materials and experiences. Chat capabilities can support both group discussions and private messaging;

- Feedback and Evaluation System for Instructors – the capability for students to provide feedback on courses and instructors. This feedback system helps improve course quality and personalize teaching approaches, fostering a stronger connection between students and educators;

- Notification System – automatic notifications regarding new materials, assignments, changes in schedules or courses, and reminders about assignment deadlines or upcoming exams. The notification function may also include alerts for new messages or responses in forums.

- Progress Monitoring Dashboard – visualization of student progress through graphs, tables, and statistics. Students can track their progress, while instructors can guide and analyze the performance of all students, including grades, completed assignments, and participation in discussions;

- Assignment Management System – the ability for instructors to create assignments in

various formats (essays, projects, lab work, presentations), establish submission deadlines, and receive notifications about overdue tasks. Students can upload completed assignments through the platform;

- Certification and Diplomas – the capability to create and issue certificates or diplomas upon course completion. This functionality may include electronic signatures, the option to download and print documents, as well as the addition of course information and details concerning the achievements of students and instructors;

- Integration with External Resources and Tools – the capability to connect with other platforms, external textbooks, libraries, or videoconferencing tools (such as Zoom or Microsoft Teams) and cloud document services (like Google Docs or Dropbox). This increases functionality and promotes greater flexibility in learning.;

- Mobile Accessibility and Applications – the availability of an adaptive mobile version or a standalone application that allows users to engage in learning from mobile devices. It is important that the application supports all core functionalities of the platform, including access to materials, completion of assignments, and participation in forums;

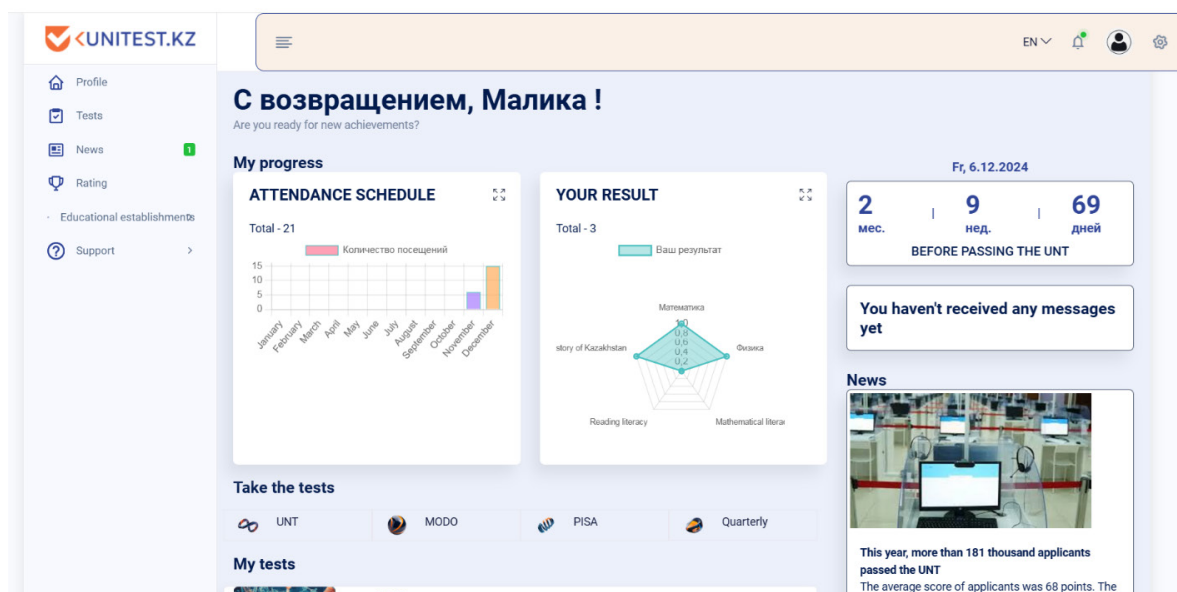


Figure 3 – Example of notification system

Note – taken from the website «Modern system of knowledge diagnostics for students and schools»

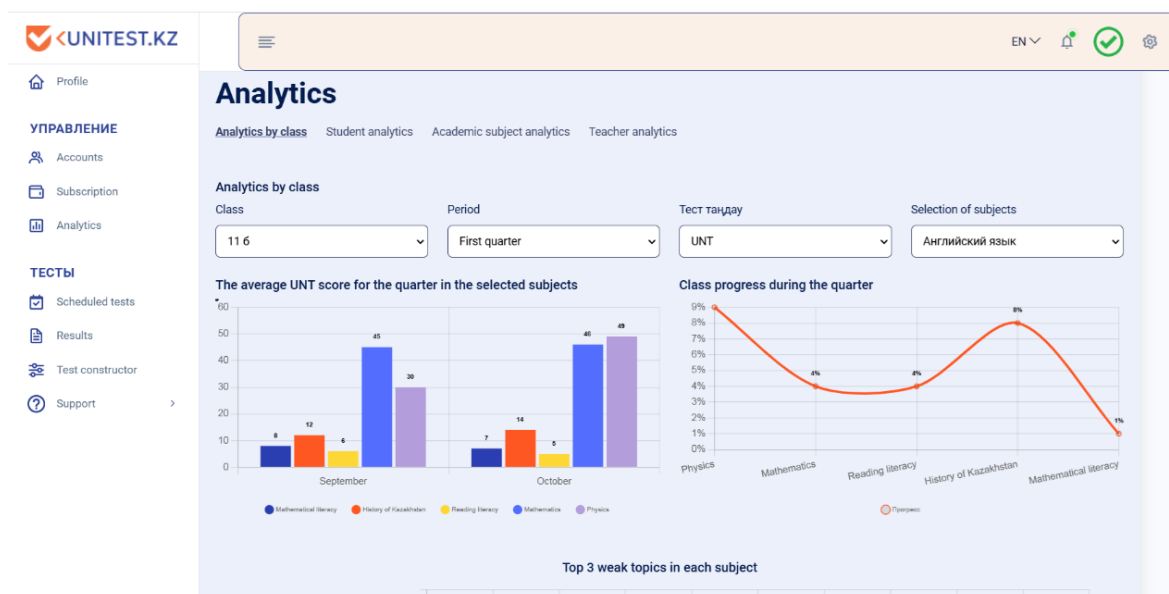


Figure 4 – Example of monitoring students' progress

Note – taken from the website «Modern system of knowledge diagnostics for students and schools»

- Adaptive Learning and Personalization – a system that tailors course content to meet individual students' needs based on their knowledge levels, interests, and progress. This might include recommendations for courses, needed learning materials, or personalized assignments and tasks, with future opportunities for employing self-learning artificial intelligence to enhance this feature;

- Data Security and Protection – protecting users' personal data, encrypting information, and securing online payments are crucial. Additionally, having a data backup system and implementing measures to avoid data breaches is important.

These functions will help create a system that is effective, user-friendly, and secure for all participants in the educational process. Furthermore,

it will serve as a valuable tool for both internal and external quality control at all levels.

The developed product will feature several distinctive and unique functions that are only partially present in other Learning Management Systems (LMS) or are entirely unique. Primarily, it will include a system for the development of educational materials and various assignments. Each educator will have the capability to independently create tasks and, if desired, share them with other users after undergoing evaluation by independent specialists. Upon successful evaluation, compensation will be provided for each created task. Subsequently, the user may become an expert by preparing the required number of questions and also receive payment, now in the capacity of an expert, while retaining the ability to create questions. This will not only enhance and diversify the assignments within the system but also increase user engagement.

Additionally, a rating system will be implemented for all user levels, starting from students and their achievements within the framework of educational institutions, localities, regions, and the country as a whole. This rating will also facilitate the assessment of the success of institutions, localities, districts, and regions collectively. This LMS will enable tracking and analysis of results at the level of individual learners, extending to regional or district levels. Furthermore, there is a function for the assessment of the teaching staff and administration, which will enable the evaluation of their level of preparedness. The quality of the educational process will be distinctly reflected in the outcomes of the learners, thereby allowing for the assessment of the effectiveness of educators, institutions, and educational administrations. This means that the evaluation of educational professionals can be based not only on the individual's knowledge but also on the learning outcomes of their students. This approach will render the system as a whole results-oriented and of high quality.

To enhance student engagement with the system, a gamification framework will be integrated. In real-time, learners will be able to view their results, enabling them to assess their chances of receiving grants for educational institutions. Furthermore, grants and discounts will be available for the most active and successful learners in their future educational endeavors, particularly from the platform itself.

This system has been specifically designed for schools and colleges in Kazakhstan, making

it entirely unique, especially given its extensive functional capabilities. The number of colleges in Kazakhstan is more than ten times lower than that of schools, with 724 versus 7440. Consequently, the decision was made to adapt this system for secondary education at first, as it represents a broader market. However, implementation in the college sector remains pertinent, as noted earlier, due to the connection between vocational education programs and schools.

Currently, the new LMS is undergoing trials with a group of learners. Marketing and economic research is being conducted, alongside a market analysis of its needs. Upon obtaining results, all data will be reflected in future publications. Therefore, it can be concluded that this work encompasses not only a theoretical analysis but also has practical applications.

Conclusion

The LMS is vital in today's education landscape, making this research essential for identifying ways to use it effectively and maintain quality, particularly in the rapidly evolving technical and vocational sectors. This study stands out from previous research in a couple of key ways: first, it seeks to create a comprehensive success model that incorporates various information systems specifically for LMS use in vocational education institutions. Second, it compares LMS features across secondary education, higher education, and vocational training settings. As a result, this research will pave the way for further analysis and provide valuable insights into LMS usage in vocational education. Additionally, it uncovers new factors that influence LMS in these institutions. The development of LMS goes beyond just technical requirements; it also involves the cognitive and physical growth of users in a vocational education context.

The theoretical and practical insights from this study will guide improvements in LMS by integrating both technological and human elements, ultimately enhancing the quality of future LMS designs in vocational education. The study is seen as a surefire way to encourage academics in this area to produce additional advances in LMS in particular and intelligent systems in general. Furthermore, the study encourages colleges who have not yet implemented learning management systems (LMS) to do so in order to improve the quality of education and the learning process.

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Information about authors:

Bizhanov Nurzhan – Director of “High Med College”, PhD student of the Department of Management, al-Farabi Kazakh National University (Almaty c., Kazakhstan, e-mail: bizhanov.n@gmail.com);

Manarbek Gulden (corresponding author) – PhD, an acting associate professor at the Department of Management, al-Farabi Kazakh National University (Almaty c., Kazakhstan, e-mail: gulden.manarbek@kaznu.edu.kz).

Aijaz A. Shaikh – Doctor of Sciences, Professor, University of Jyvaskyla and The Institute of Information and Computational Technologies (Jyvaskyla c., Finland; Almaty c., Kazakhstan, e-mail: aijaz.a.shaikh@ipic.kz)

Авторлар туралы мәлімет:

Бижанов Нұржан Нұрболұлы – «High Med College» директоры, әл-Фараби атындағы ҚазҰУ, Менеджмент кафедрасының докторанты (Алматы қ., Қазақстан, e-mail: bizhanov.n@gmail.com);

Манарбек Гүлден Манарбекқызы (корреспондент автор) – PhD, әл-Фараби атындағы ҚазҰУ, Менеджмент кафедрасының доцент м.а. (Алматы қ., Қазақстан, e-mail: gulden.manarbek@kaznu.edu.kz).

Айжаз А. Шайх – ғылым докторы, профессор, Ювяскюля университеті (Ювяскюля қ., Финляндия; e-mail: aijaz.a.shaikh@ipic.kz)

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