

ENHANCING LEARNING MANAGEMENT SYSTEMS (LMS) THROUGH KANO ANALYSIS

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Abstract

This article explores the critical role of information and communication technology (ICT) in modern educational settings and emphasizes the importance of understanding stakeholders' needs in the development of digital learning tools, particularly Learning Management Systems (LMS). Drawing from the Kano Model of Satisfaction, the study examines how stakeholders evaluate digital learning products and proposes a new LMS design tailored to their preferences. The paper provides insights into the acceptance and utilization of digital learning tools by stakeholders in Higher Education Institutions (HEIs), highlighting the challenges and opportunities in incorporating LMS into educational organizations. Additionally, it presents new functional factors for newly designed LMS and discusses the implications of digital learning systems in the context of modern education. Finally, the article addresses the limitations of current LMSs and underscores the importance of stakeholder acceptance for successful implementation in educational institutions.

Keywords: Information and Communication Technology (ICT), Digital Learning Tools, Learning Management System (LMS), Stakeholders, Kano Model, Higher Education Institutions (HEIs), features, TPACK, TAM.

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Introduction

The 21st century today demands an educational structure which caters to the demands and skills of the new generation in this digital age (OECD, 2019). As per Ferri et al. (2020, pp. 2-3) it is mentioned that a digital learning system implemented properly acts as a crucial support structure for the delivery of modern constructive coaching. Rahman et al. (2019, pp. 1533-1534) state that therefore, in real-life situations, it's crucial to pay attention to what stakeholders of learning organizations need even before we create a product or service. Madzík et al. (2019) suggest that by making better decisions and understanding stakeholder needs and comparing them with what we can offer, the intended outcome that stakeholders expect can be understood. Therefore, Kłopotek et al. (2021) suggest that the Kano Model of Satisfaction developed by professor Noriaki Kano in the year 1984, plays a crucial support to identify the stakeholders need and is extensively employed by numerous educational and training institutions to assess the impact of individual service components on overall student satisfaction within broader service domains, particularly concerning academic advising or the intended digital learning outcomes (IDLO) of stakeholders in Higher Education Institutions (HEIs). According to Simanullang et al. (2021, pp. 1-2) Learning Management System (LMS) is an application software, which is widely used to facilitate the purpose of digital learning practices. Therefore, designing an LMS to satisfy the needs of stakeholders of HEIs is one of the crucial factors. This study prominently incorporates the theory of attractive quality (Kano model) to analyse the needs of stakeholders for digital learning tools. Fujs et al. (2022, pp. 1-2) states that Kano analysis can offer a better understanding of how stakeholders of HEIs evaluate a product and assist the development of new LMS by focusing on the most important attributes that need to be improved.

Aim: The aim of the KANO analysis for this particular research is to develop a new Learning Management System (LMS) that is designed as per the preferences of the stakeholders of HEIs.

Theoretical Novelty: The theoretical novelty of this study lies in its comprehensive exploration of the role of LMS in adaptive learning, the challenges in LMS implementation, daily struggle of teachers and other stakeholders of HEIs in Latvia with LMS.

Practical Novelty: The newly designed LMS will offer 22 new functional features namely from F1 to F22. These features comprise various LMS attributes such as ease of use, interactivity index, interconnectivity, design, and layout, (Application Programming Interfaces) API integration, compatibility with various mobile devices, monitoring learners' performances as well as Human Resource and Accounts Modules integrated.

Objective: This paper caters crucial support to any HEI on the path of incorporating digital learning tools, specifically LMS into their organization. This paper highlights the perspectives of stakeholders of HEIs in terms of acceptance and utilization of digital learning tools in their daily routine.

This paper highlights the Kano Method research findings and analysis for the Ph.D. research paper of the author.

Literature: The 21st century today demands an educational structure which caters to the demands and skills of the new generation in this digital age OECD (2019). As per Ferri et al. (2020, pp. 2-3) it is mentioned that a digital learning system implemented properly acts as a very crucial support structure for the delivery of modern constructive coaching. As per Rabiman et al. (2020, pp. 1059-1060) it is further stated that in this modern era of education which is known as the informational era of education, learners have adequate time so that they develop the ability and skills that are necessary to maintain the pace of the educational sector. In the modern age of LMS education is framed according to the student-centered approach and therefore it diverts the role of teachers in way that they become more of a guide than that of a knowledge center. As per Xiao et al. (2020, pp. 1204-1207) another reason why hybrid learning had gained popularity is because of the Covid-19 pandemic situation across the globe and hybrid learning is an excellent answer to support learning in such situations. LMSs were instrumental especially during the time of Covid-19 pandemic, which has made the entire education industry switch to online mode of education. Even though LMSs have been popular and are widely adopted for their vast offering that aids digital learning and education, several authors (Umar et. al., 2017; Bervell et al., 2022; Nasir et.al., 2021) have argued that LMSs still have limitations that cannot be overlooked. For example, LMSs do not support interactive and technology-driven pedagogies to cater to individual learning preferences and integrate seamlessly with both virtual and face-to-face learning methods.

Umar et al. (2017) highlighted some of the drawbacks of LMSs and one of the major factor that was figured out in the research is the primary acceptance and endorsement of the stakeholders (teachers/ trainers/ educators/ students/ course designers/ administrative & management personnel as well as owners and managers of the educational institutions or organizations). As per Anderson and Dron (2017) majority of LMSs are restricted to authorized users deliberately so that the higher authorities of the educational organizations can govern them. Aldahwan and Alsaheed (2020, p. 16) laid forth some limitations of current LMS like Moodle that it does not support cloud integration for better scalability and flexibility or the use of artificial intelligence AI for adaptive learning and personalized education experiences.

Kłopotek et al. (2021) state that the Kano method, which was pioneered by Noriaki Kano in the 1980s, has now formed into a prominent framework in product development and customer satisfaction analysis. Predominantly developed as a tool for quality management, the Kano method has over the period evolved into a comprehensive framework that answers the understanding of customer requirements and expectations. Kano's pivotal work is to categorize customer preferences into five distinct categories: Namely basic, performance, attractive, indifferent, and reverse qualities. Over time, researchers and scholars have refined and extended the Kano model to cater to the needs of various industries and sectors. According to Yao et al. (2018) the Kano model is helpful for understanding and clarifying requirements of a product during early stages in the development process and further it is also helpful for guiding

numerous stages of service delivery. Exercising Kano survey helps organizations to better their service design, development, and verification by concentrating on particular features identified via customer feedback. Research by Nurjannah et al. (2020, p. 25) highlighted that, integrating the Kano model with Quality Function Deployment (QFD) is a powerful Total Quality Management (TQM) tool that can significantly enhance the quality of universities. The House of Quality (HoQ) matrix, in particular, highlights key areas for improvement that can effectively be implemented within private universities to optimize their overall quality. As per Ginting and Ali (2014) a similar study in relation to the satisfaction level of stakeholders of educational set-up was carried out at University Sumatera Utara among students during the first step, where students (as consumers) were grouped according to different types of requirements based on Kano quality factors. The organized survey questions were grouped into three main areas: teaching and learning activities, practical work activities, and administrative tasks. Then, the survey results were analyzed to classify each requirement according to Kano's categories. This helped Ginting and Ali to understand how each requirement affected student satisfaction.

Methodology

The author has used Kano analysis to measure the satisfaction level of the stakeholders with the newly planned LMS named "Scrolle". The analysis is based on the feedback received from the stakeholders of HEIs in Latvia according to a questionnaire prepared and distributed selectively. Two Google forms were created, one in English and the other one in Latvian with a particular emphasis on framing questions to adhere to the Kano principles. The questionnaire was designed in two languages to reach the majority of local respondents as well as international respondents in the educational field in Latvia involved in teaching/training or learning.

Furthermore, self-importance ratings were carefully considered for each of the specific product feature codes, which collectively encompass a total of 22 distinct features. To ensure a thorough and nuanced understanding, the analysis was conducted using both continuous and discrete methodologies. This dual approach allowed for a comprehensive evaluation of the data, capturing both the small details and broader trends associated with each feature. The results were then systematically analysed and summarized, with a descriptive focus that aimed to clearly articulate the significance of each feature in relation to the overall product evaluation. This methodical process ensured that the findings were robust and could be effectively communicated, providing valuable insights into the relative importance of the various product features.

The Technology Pedagogy Content Knowledge (TPACK) framework, as outlined by Mishra et al. (2017) and Technology Acceptance Model (TAM), discussed by Han and Sa (2021, pp. 404-405) serve as the primary models and frameworks guiding the development of the question sets used for both qualitative and quantitative research purposes. These models are instrumental in ensuring that the questions are comprehensive and relevant, addressing the multifaceted nature of teaching with technology. The incorporation of TPACK highlights the importance of integrating technology with pedagogical content knowledge, while TAM emphasizes the critical role of perceived ease of use and usefulness in technology adoption. Together, these models underscore the necessity of considering various paradigms to address the diverse criteria involved in effective teaching and learning in a digital environment. This approach ensures that the research captures a holistic view of how technological tools can be effectively integrated into educational practices, considering both the pedagogical and technological dimensions.

Research process: The research methods used in this research encompass a mixed methodology approach, combining quantitative and qualitative techniques to investigate the adaptation of stakeholders in higher education to digital technologies. The methods employed include:

- Literature Review: Covering topics like digital learning, Learning Management Systems (LMS), and the impact of technology in higher education.
- Comparative Analysis: A literature review on Moodle LMS evaluating the LMS platforms to assess its features and suitability and useability in higher educational institutions in Latvia.

- Utilization of Theoretical Frameworks: Such as the Technology Acceptance Model (TAM) and the Technological Pedagogical Content Knowledge (TPACK) Framework to analyse technology integration in education.
- Interviews: Conducted with stakeholders including teachers, and senior management in higher education institutions in Latvia.
- Questionnaires: Prepared for quantitative analysis to measure limitations in the LMS platform and, for KANO analysis sent to stakeholders of Higher Education Institutions (HEIs) in Latvia.
- Sampling Methods: Including Probability Sampling (simple random sampling), Quota Sampling, and Cluster Sampling to gather data from students, teachers, and management in HEIs.
- Data Analysis: Descriptive analysis of collected data, content analysis of interview data.

Research question: Will the newly designed LMS model fulfil the Technology Acceptance Model (TAM) criteria?

Research period: November 2021 – December 2023.

Research Method 1 Quantitative: Stakeholders' who participated in the "Scrolle" survey were specifically targeted according to the Higher Education institutions in Latvia. The pilot test data collected feedbacks from 15 respondents who answered questions that highlighted limitations with LMS, preference factors, daily struggle, inclusion of artificial intelligence for digital learning, and connection of a personal touch with digital modes of learning. The survey with closed-ended questions with functional & dysfunctional and currency of importance attributes for Kano analysis were designed considering the different job titles and roles of stakeholders in an educational setup. The form was designed in a way that took the respondents to their specific section once they selected their professional title. Respondents who participated in the pilot survey had the following professional titles:

Table 1 Respondents Position and Title (Quantitative)

Respondents' Position and title (Quantitative)	Respondents' Position and title (Quantitative)
1. Rector/Vice-Rector/Dean/Vice-Dean/Chair	9. Librarian or other Library Staff/Executive
2. Head of the Department/Director/Deputy Director/Manager	10. Student Support Staff (Admissions officer, administrator, secretary, Clerk)
3. Professor/Associate Professor/Assistant Professor	11. Maintenance Head/Assistant (Responsible for the Campus/building Maintenance)
4. Lecturer/Assistant Lecturer	12. Information & Technology (IT) Head/Administrator/Executive
5. Teacher/Trainer/Mentor	13. Head/Coordinator/Assistant for (Erasmus/Education/Projects/Other)
6. Educational Expert	14. Student of Bachelor or Master studies in Latvian HEIs
7. Financial Specialist/Finance Director/Accounts Manager/Accountant	15. Public Relations Head/Marketing Head/Assistant/Executive
8. Human Resource Head/Manager/Executive/Employee	16. Head/Manager/Assistant/Executive for (Hostel or Lodging facilities)

Explanation of the Tool

In order to measure the satisfaction level of the customers which will be derived by the use of "Scrolle" LMS, the author has used Kano analysis. The analysis is based on the feedback received from respondents according to the questionnaire prepared and distributed selectively. The initial three questions of the survey were standardized for all respondents, ensuring consistency in the data collection process. Upon

completion of the third question, respondents were automatically directed to a set of questions tailored to their specific job duties. The time required to complete the form varied depending on the respondent's job category, reflecting the customization of questions based on their role.

The questions within the survey were systematically categorized according to the KANO Method, which distinguishes between functional and dysfunctional attributes. This categorization is employed to facilitate a precise analysis of the collected data, enabling a deeper understanding of user satisfaction and preferences. Respondents were advised to read each question carefully before selecting the most appropriate response, ensuring the accuracy and relevance of their answers. Furthermore, the survey incorporated questions related to the use of a Learning Management System (LMS), a digital platform designed to streamline the management and delivery of educational content and training programs. At the beginning of the questionnaire a definition of a LMS coined by Bradley (2021, p. 68) i.e. a LMS serves as a centralized hub for creating, storing, organizing, and distributing learning materials, making it an essential tool for modern educational and training environments, was provided to stakeholders.

Moreover, self-importance ratings were also taken into consideration for specific product feature codes that comprised a total of 22 features (refer table 2). The analysis was carried out in a continuous as well as discrete way and the results were analysed and summarized in a descriptive way accordingly. This context underscored the importance of the survey in assessing the functionality and effectiveness of LMS platforms in supporting educational outcomes.

Table 2 LMS Model Scrolle Features

Code	Product Features
F1	New LMS that is easy to learn, customize, teach and work upon
F2	New LMS which is compatible to run both on Mobile phone and Desktop
F3	New LMS that offers self-learning onboarding tutorials
F4	New LMS offering seamless tracking & monitoring, also effortless customization of tasks, study materials, and lesson plans tailored to specific digital outcomes (IDLO).
F5	New LMS that facilitates online classes, enables lecture recording conveniently
F6	New LMS that offers customization in your native language
F7	New LMS that helps you design courses and creates lecture/ training content with the help of Artificial Intelligence (AI)
F8	New LMS equipped with Artificial Intelligence addressing course-related queries 24/7
F9	New LMS that helps you connect with other universities on a global platform
F10	New LMS that showcases the workload for each student or class
F11	New LMS that offers a diverse range of interactive options, engaging gamification
F12	New LMS that offers social medial integration
F13	New LMS offering a versatile platform to access interactive video and audio tutorials
F14	New LMS offering a dynamic daily update on upcoming scientific conferences
F15	New LMS incorporating automatic plagiarism detection
F16	New LMS that adds a personal touch by generating customized automatic greeting cards for registered stakeholders
F17	New LMS empowering students and teachers with unrestricted access to a digital library
F18	New LMS that offers sophisticated class scheduling capabilities
F19	New LMS that will help HR operations by automating policy updates through news feeds
F20	New LMS that transforms your scrolling habit from social media to productive learning
F21	New LMS that facilitates complete paper less working
F22	New LMS that allows the possibility of self-evaluation for organizations and individuals

Table 2 gives an overview of the new Learning Management System (LMS) proposed by the author, which will be designed with a comprehensive suite of features aimed at enhancing user experience, customization, and accessibility. Key features include ease of learning and use, compatibility across mobile and desktop devices, and AI-driven tools for course creation, content development, and 24/7 query

support. The LMS supports the facilitation of the online classes, lecture recordings, and personalized onboarding tutorials. It will also be able to facilitate global connections with other universities, the offer of interactive and gamified learning options, and convenient integration with social media. Additional features include automatic plagiarism detection, digital library access, sophisticated class scheduling, and daily updates on scientific conferences, making it a versatile and powerful tool for modern education.

A summary of what each element generally represents in the KANO method categories is provided below:

M, P, A, I, R, Q: are categorical codes representing different response metrics, where:

M stand for "Must-have"	I stand for "Indifferent"
P stand for "Performance"	R stand for "Reverse" or "Rejected"
A for "Attractive"	Q stand for "Questionable" or "Neutral"

Findings (Quantitative): Table 3 below shows the categorization of a discrete analysis, that was conducted on the data collected from the pilot testing survey for each criterion.

Percentages in the Columns: Each percentage represents the proportion of responses that fall into the corresponding category (M, P, A, I, R, Q) for a specific feature or question.

Total: This column confirms that all categories sum up to 100% for each row, indicating that the data is complete and categorized fully.

Cat (Category): The final column, labeled "P" in most rows, indicates that the majority of responses for that particular item/code fall within the "Performance" category.

Table 3 Discrete analysis for Scrolle (Pilot Testing)

Discrete Analysis								
F.Code	M	P	A	I	R	Q	Total	Cat
F1	2.13%	57.45%	29.79%	2.13%	0.00%	8.51%	100.00%	P
F2	0.00%	77.19%	14.04%	1.75%	3.51%	3.51%	100.00%	P
F3	0.00%	73.68%	5.26%	17.54%	0.00%	3.51%	100.00%	P
F4	0.00%	75.44%	17.54%	0.00%	1.75%	5.26%	100.00%	P
F5	0.00%	70.18%	26.32%	0.00%	0.00%	3.51%	100.00%	P
F6	0.00%	49.12%	24.56%	15.79%	1.75%	8.77%	100.00%	P
F7	0.00%	56.14%	40.35%	0.00%	0.00%	3.51%	100.00%	P
F8	0.00%	56.14%	42.11%	0.00%	0.00%	1.75%	100.00%	P
F9	0.00%	68.42%	29.82%	0.00%	1.75%	0.00%	100.00%	P
F10	0.00%	63.16%	28.07%	0.00%	3.51%	5.26%	100.00%	P
F11	0.00%	97.87%	0.00%	0.00%	2.13%	0.00%	100.00%	P
F12	0.00%	2.13%	2.13%	0.00%	89.36%	6.38%	100.00%	R
F13	0.00%	59.57%	36.17%	0.00%	0.00%	4.26%	100.00%	P
F14	0.00%	63.83%	27.66%	2.13%	0.00%	6.38%	100.00%	P
F15	2.13%	70.21%	21.28%	0.00%	0.00%	6.38%	100.00%	P
F16	2.13%	0.00%	2.13%	0.00%	65.96%	29.79%	100.00%	R
F17	0.00%	63.83%	29.79%	0.00%	2.13%	4.26%	100.00%	P
F18	0.00%	65.96%	31.91%	0.00%	2.13%	0.00%	100.00%	P
F19	0.00%	51.06%	31.91%	0.00%	0.00%	17.02%	100.00%	P
F20	0.00%	57.45%	29.79%	0.00%	2.13%	10.64%	100.00%	P
F21	0.00%	55.32%	36.17%	0.00%	2.13%	6.38%	100.00%	P
F22	0.00%	93.62%	6.38%	0.00%	0.00%	0.00%	100.00%	P

Interpretation

Predominance of "P": Most rows show a high percentage under the "P" category, meaning that respondents view these features as performance-related—important but not necessarily differentiators unless they exceed expectations.

Variations in Responses: A couple of rows, like F12 and F16, the ones showing higher values in the "R" ("Reverse" or "Rejected") category, indicate features that are seen negatively or are not performing as expected.

Distribution of Feedback: The table illustrates how different features or questions are perceived across various categories, allowing for a nuanced understanding of what users find essential, desirable, or problematic.

This analysis therefore provides a valuable support in understanding user priorities, satisfaction levels, and areas for improvement, particularly in the development of the LMS Scrolle and service enhancement contexts.

The discrete analysis gives a broader overview of the acceptance or rejection of each and every feature by the stakeholders of educational/learning organizations. The discrete analysis produces the percentage of like/expectation or want stakeholders show towards each specific product feature, mentioned in table 2. According to the data gathered from the designed questionnaire it is evident in the continuous analysis that almost all 20 out of the 22 features of the "Scrolle" are accepted by stakeholders of HEIs in Latvia with the exception of feature (F12 & 16) that yield a value of (R) in the category which according to Kano rules means Reverse. As per Rust (2020) it is not always the same and however, things can even change whilst the product is in the pilot testing stage as it is observed that people's needs, wants and minds change according to the product's versatility and changing trends.

The Performance Value (P): - value field shows that all the features of (LMS Scrolle) have gained above 50% in terms of Performance features, which means except 12 & 16 other features are highly desirable and will widely be accepted in the educational sphere once its launched and marketed to the stakeholders of learning organizations. Stakeholders are looking forward to these features combined in an LMS (Scrolle) that intends to cater digital learning outcome IDLO of the stakeholders of learning organizations.

The Attractive Value (A): - When it comes to product attractiveness the value field (A) in discrete analysis gives some of the feature's percentages below 10% in terms of attractiveness and those are the points the product needs to be worked upon to make it more attractive amongst the stakeholders of HEIs. Namely features (F3/11/12/16/22) are not considered as attractive enough by the stakeholders. This proves that stakeholders do not find (F3) self-learning tutorial attractive, neither does (F11) which is gamification of learning content appeals to the stakeholders. Further, (F16) personalized greetings are again not attractive perhaps because of many such platforms out online, although it is surprising to see the result that stakeholders do not find the self-evaluation an attractive feature for (F22). This can be related to lack of motivation or interest in underlining self-competences.

The Indifferent Value (I): - For this field it can be seen that code (F3) which is self-learning tutorials receives 17.54% which again proves that stakeholders do not consider this feature as something new, and this feature needs to be changed or be more specified as self-learning tutorials are already being offered by other LMS platforms and hence it is considered indifferent. (F6) feature that gives the liberty to customize the content in the native language is again considered not innovative or new as other platforms already provide this feature. This guides towards drafting a more innovative approach towards this feature and perhaps speech to text feature can be replaced here with native language customization.

The Questionable Value (Q): - for feature (F16) again raises concern as this feature is not accepted and even falls under the questionable category, providing an insight that stakeholders are not sure why an educational platform needs to have a feature of personalized greeting? This offers the author an insight into the mindset with which professionals in the educational industry work and divide their work and

tasks. Therefore, it is evident that features that aid personal interactions may not be widely accepted and must be avoided in incorporating in a new LMS design.

The Reverse Value (R): -To overcome the reverse value (R) for “Scrolle” it is important to see what features are being rejected, in this case, it is (F12&F16) that integration with social media and other platforms is not welcomed by the stakeholders of HEIs.

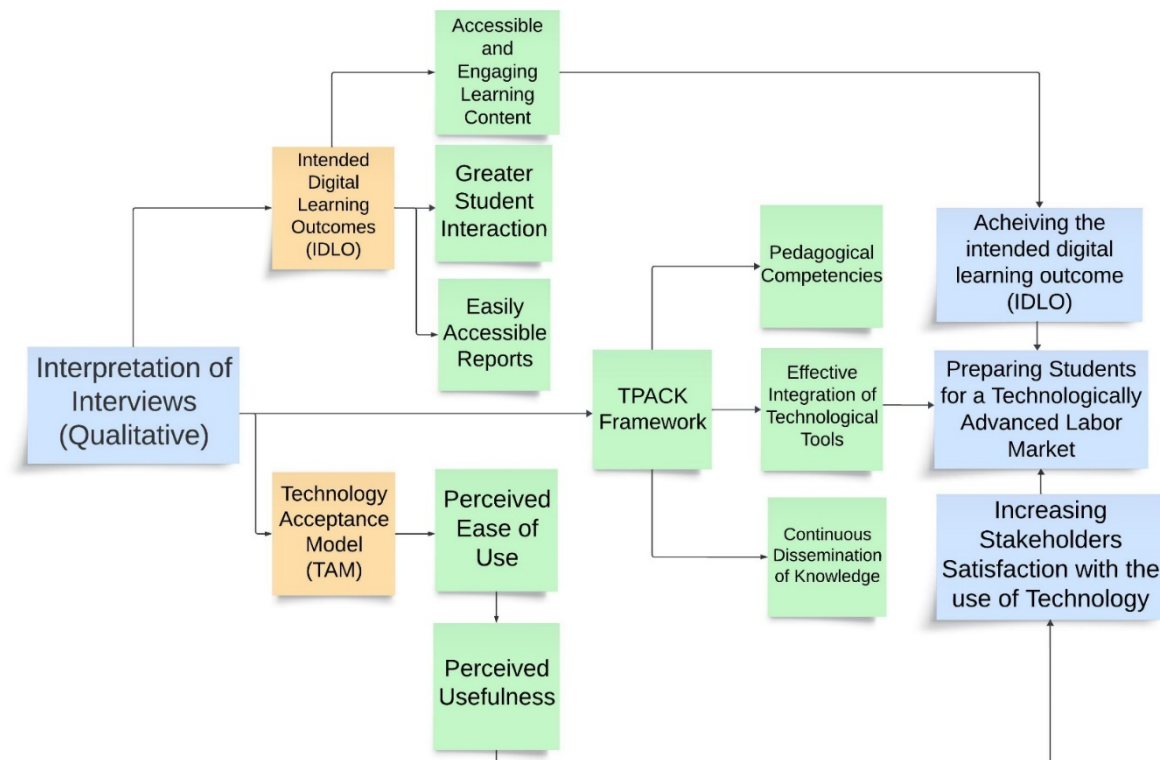
Research method 2 (Qualitative): Stakeholders’ structured interviews from stakeholders of HEIs in Latvia. Among the Interviewees were:

Table 4 Position and title (Qualitative)

Position and title (Qualitative)	Years of Experience
1. Head of the Department and professor of university	25
2. Head of the Department and lecturer/mentor of university	23
3. Director of a higher educational organization and lecturer	20
4. Lecturer at the university	10
5. Lecturer at a higher educational organization	7

Table 4 provides a detailed overview of the stakeholders from higher education institutions in Latvia who participated in the interviews and responded to the structured questions. This table outlines the academic titles and years of experience each stakeholder has within the industry. Based on the interviews conducted, the author has developed an illustrative diagram derived from the interpretation of the responses, which is presented in Figure 1 below.

Figure 1. Illustrative Diagram from Stakeholders Interview Interpretation



The Figure 1, illustrates the relationship between various factors that contribute to achieving the Intended Digital Learning Outcomes (IDLO) in higher education institutions. It is divided into two primary frameworks: the Technology Acceptance Model (TAM), and the TPACK Framework. Stakeholders believe that accessible and engaging learning content, leads to greater student interaction, and easily accessible

reports help organization keep track of the progress whilst TAM, highlights the perceived ease of use and perceived usefulness of technology to increase its adoption and to enhance digital learning. TPACK Framework, emphasizes, how the effective integration of pedagogical competencies with technological tools can lead to continuous dissemination of knowledge. These elements work together to achieve key goals, such as achieving the intended digital learning outcomes (IDLO).

In essence, the diagram represents how stakeholders perceive that a LMS that is designed on frameworks like TAM and TPACK can lead to higher student engagement and support pedagogical competencies with technologically advanced tools.

Interpretation of the interviews (Qualitative): The interpretation of the interviews conducted with the head of departments and the director revealed the intended digital learning outcomes that the management seeks from the current and future implementation of digital learning tools. The interviewees emphasized that, while information and communication technology (ICT) in education is not a novel concept, the rapid pace of technological advancement necessitates a continuous adaptation of curricula. This is essential to adequately prepare students for a technologically advanced and integrated labour market.

Moreover, the content analysis indicated that the intended digital learning outcomes (IDLO) envisioned by management across different organizations are largely consistent. Management generally seeks to create more accessible and engaging learning content and teaching methods, which facilitate greater student interaction with course materials. Additionally, there is a strong reliance on the ability of digital tools to generate easily accessible reports, which are crucial for understanding various educational, financial, and management scenarios within the educational environment.

The Technology Acceptance Model (TAM) further supports this finding, as it emphasizes that perceived ease of use and perceived usefulness are critical factors in the adoption of new technologies. In line with TAM, the ease of interaction with digital tools and their perceived effectiveness in enhancing learning outcomes are key considerations for management.

The content analysis of interviews conducted with teachers from Latvian higher education institutions (HEIs) underscores the pivotal role of the Technology, Pedagogy, and Content Knowledge (TPACK) framework in technology-enhanced teaching. The findings reveal that technology alone cannot fully facilitate the learning process within a digital environment. Consequently, the pedagogical competencies of teachers or trainers are equally essential.

Of particular importance is the ability and skills of educators to effectively integrate technological tools and platforms into their teaching practices, adapting to evolving trends without necessitating significant changes to their core pedagogical approach. A trainer who is proficient in both technology and the design and delivery of learning content that complements digital tools is better positioned to create a more engaging, interactive, and accessible learning experience, thereby facilitating the continuous dissemination of knowledge.

Discussion- Lessons learned

The literature emphasizes the critical need for educational structures in the 21st century to address the demands and skills required by the new generation in the digital age (OECD, 2019). A well-implemented digital learning system, as Ferri et al. (2020) note, is essential for supporting modern, constructive teaching approaches. However, the success of such systems depends significantly on understanding and meeting the needs of stakeholders in educational institutions before developing or deploying any digital tools or services Rahman et al. (2019). Madzík et al. (2019) further suggest that aligning stakeholder needs with what can be offered is key to achieving the intended digital learning outcomes (IDLO).

The Kano Model of Satisfaction 1984, Taifa and Desai (2016, p.569-570) is highlighted as a valuable tool in this context, aiding educational and training institutions in assessing how individual service components impact overall student satisfaction, particularly in the realm of academic advising and digital

learning Simanullang et al. (2021). The model categorizes customer preferences into basic, performance, attractive, indifferent, and reverse qualities, offering a structured approach to understanding and prioritizing stakeholder needs Kłopotek et al. (2021).

The Kano model is particularly valuable in addressing these challenges by guiding the development of LMS features that align with stakeholder expectations Yao et al. (2018). Studies integrating the Kano model with Quality Function Deployment (QFD) highlight its effectiveness in enhancing the quality of educational services, particularly in identifying areas for improvement in university settings (Nurjannah et al., 2020; Ginting and Ali, 2014).

The analysis focused on evaluating user satisfaction with the "Scrolle" LMS using the Kano model, revealing key insights into the stakeholders' preferences and expectations. Most features were categorized as "Performance" attributes, meaning they are essential and expected by users, but their impact on satisfaction increases if they perform above expectations. However, features like social media integration (F12) and personalized greetings (F16) were rejected or deemed unnecessary, indicating areas where the LMS could be improved or simplified.

Additionally, qualitative interviews with educational leaders highlighted the importance of aligning digital learning tools with evolving educational goals. The Technology Acceptance Model (TAM) and the TPACK framework emerged as crucial for successful technology integration in teaching. Both frameworks emphasize the need for digital tools to be easy to use and effective in enhancing learning outcomes, alongside the importance of teachers' ability to adapt pedagogical methods to incorporate these technologies effectively.

Overall, the study provides a comprehensive understanding of the "Scrolle" LMS's strengths and areas for improvement, guided by user feedback and expert insights.

Conclusion

The study investigates the satisfaction level of customers using Learning Management System (LMS) "Scrolle" proposed by the author, through a combination of Kano analysis and qualitative interviews with stakeholders from higher education institutions (HEIs) in Latvia. Kano analysis categorized the LMS features based on user feedback, revealing which features were essential, desirable, or problematic. Qualitative interviews provided additional insights into how digital tools align with educational goals.

The results from the Kano analysis indicate that most features of the Scrolle LMS are highly valued for their performance, with 20 out of 22 features receiving positive feedback. However, features like social media integration and personalized greetings were less accepted, falling under the "Rejected" or "Reverse" categories. Additionally, certain features, like self-learning tutorials and gamification, were considered less attractive or indifferent by stakeholders. The qualitative interviews further emphasized the importance of technology's role in education, particularly the need for tools that are easy to use and align with digital learning outcomes (IDLO).

Will the newly designed LMS model fulfill the Technology Acceptance Model (TAM) criteria?

Yes, the newly designed LMS model, "Scrolle," largely fulfills the Technology Acceptance Model (TAM) criteria. The majority of its features are perceived as useful and easy to use by the stakeholders, which aligns with TAM's core principles of perceived usefulness and ease of use. However, certain features may need further refinement to enhance user acceptance fully.

Implications for Future Research and Target Groups

Future research should explore further improvements in features that were less accepted, such as social media integration and personalized greetings, to better meet user expectations. Additionally, there is a need to focus on making self-learning tutorials and gamification more attractive and innovative. Research could also investigate how these findings can be generalized to other regions or educational sectors. Target groups, including educational institutions such as vocational training organizations and technology

developers engaged in designing educational content, can consider these insights to refine and optimize LMS features, ensuring they align more closely with user needs and educational outcomes.

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