INTERNATIONAL JOURNAL OF MODERN EDUCATION STUDIES

| Volume 9 - No 2 - December 2025 - ISSN 2618-6209 |

Research

Learning Management System Satisfaction and Transactional Distance: Insights from Open and Distance Learners[1]

Havva Buhan[2] **Erhan Ünal** [3]

Article Type
Original Research

International Journal of Modern Education Studies
2025
Volume 9, No 2
Pages: 651-672
http://www.ijonmes.net

Article Info:

Received 06.08.2025
Revision 01.12.2025
Accepted 08.12.2025

Abstract:

It is crucial to examine learners' perceptions of interaction and their satisfaction with the Learning Management System (LMS), given the inconsistent literature on this relationship. This study aimed to assess open and distance learners' LMS satisfaction, their perceptions of transactional distance, and the association between them. Using a correlational design, data were analyzed from 1,003 learners who completed the Anadolum eCampus System Satisfaction Questionnaire and the Transactional Distance Scale. Results indicated that "read-explore-learn" materials were the most satisfying, while "listen-learn" materials were the least preferred. Although students reported high LMS satisfaction, their perception of transactional distance was moderate. Notably, overall satisfaction was strongly predicted by Learner–Content, Learner–Interface, Learner–Learning Environment, and Learner–Teacher interactions, whereas peer-to-peer interaction did not contribute significantly. These findings suggest that instructional design in distance education should prioritize content and interface accessibility over social interaction to enhance learner satisfaction.

Keywords:
Open and distance education, e-learning materials, interaction, transactional distance, learner satisfaction.

Citation:
Buhan, H., Ünal, E. (2025). Learning Management System Satisfaction and Transactional Distance: Insights from Open and Distance Learners. *International Journal of Modern Education Studies, 9*(2), 651-672. https://doi.org/10.51383/ijonmes.2025.429

[1] This article was produced from the master thesis prepared by the first author under the supervision of the second author.

[2] Master of Science degree, Anadolu University, Open Education Faculty, Eskişehir, Turkey. hbuhan@anadolu.edu.tr, https://orcid.org/0009-0002-3117-2852

[3] Assoc Prof. Dr., Afyon Kocatepe University, Faculty of Education, Afyonkarahisar, Turkey. eunal@aku.edu.tr, https://orcid.org/0000-0002-5349-4193

INTRODUCTION

In contrast to traditional education, distance education allows students to access course materials at any time and from any location (Keegan, 1996; Moore, 1993). However, educational quality can be significantly affected by the structural and interactional challenges faced by distance learners (Bernard et al., 2009; Moore, 1993). Moore (1993) asserts that the main factor influencing psychological and communicative distance in distance education is the alignment between the curriculum's structural arrangements and the learner-teacher dialogue. The Transactional Distance Theory, in this context, emphasises the importance of learner-instructor and learner-content interactions. Additionally, learner-to-learner interactions are crucial for minimising the distance (Moore, 1989a, 1993). Learning management systems (LMS) play a vital role in enhancing the learning experience by facilitating learner-instructor and learner-learner interactions as well as the flexible delivery of content in distance education (Jung et al., 2002; Kurucay & Inan, 2017). Over time, the concept of interaction has evolved alongside advancements in distance education technologies. New dimensions, such as learner-interface interaction (usability and design features of the platform) and learner-learning-environment interaction (technical infrastructure, connection speed, and physical working conditions), have been included in the literature as variables that directly affect both the learning experience and learner satisfaction (Bernard et al., 2009; Hillman et al., 1994; Moore, 1989a, 1993). Students' perceptions of transactional distance can be reduced through all these types of interactions, leading to better learning outcomes in e-courses (Bolliger & Halupa, 2018).

Johnson et al. (2008) stated that learner satisfaction is essential for evaluating e-learning effectiveness. Moreover, factors such as course interactions and perceptions of social presence play a significant role in overall satisfaction. Therefore, learner satisfaction is closely related to the content's quality and the user-friendly design and usability features of the platform delivering that content (Hillman et al., 1994; Jung et al., 2002). Additionally, learners' interactions with each other and with the instructor are important (Kuo et al., 2014). As a result, open and distance learners' learning experiences and perceptions of interaction with the LMS influence their satisfaction with the LMS (Fulford & Zhang, 1993). In particular, learner-instructor interaction enhances learners' experiences. Similarly, learner-content interaction increases learners' satisfaction by facilitating their achievement of learning goals (Zhang, 2003).

In similar studies, Sun et al. (2008) highlighted that dimensions such as learner characteristics, instructor effectiveness, course quality, technology, design, and the learning environment all influence learner satisfaction in e-learning. Gavrilis et al. (2020) conducted a quantitative study examining the relationship between Moore's three dimensions of transactional distance and student satisfaction within a postgraduate distance learning program at the Hellenic Open University. The study confirmed that all three dimensions of transactional distance—student-teacher, student-student, and student-content—were

significantly correlated with student satisfaction, emphasising the utility of Transactional Distance Theory in evaluating distance-education programs. Karaoglan-Yilmaz et al. (2024) found that satisfaction and participation increased, especially when learner-instructor, learner-content, and learner-learner interactions were high. Singh et al. (2024) reported in their study that learner interaction with their peers and instructors are significant predictors of student satisfaction Bolliger and Martindale (2004) state that learner satisfaction in e-learning environments is shaped by several factors, including the instructor, communication (interaction resources), technology, course management, course site, interaction, and general issues. From this point of view, it is important to examine distance learners' perceptions of interaction and satisfaction with the LMS.

Problem Statement

Various institutions, including Anadolu University Open Education System, provide open and distance education. This higher education model has expanded the provision of distance education in Turkey since 1982 by offering undergraduate and associate-degree programs. The rapid growth of online education and the emphasis on continuous learning draw individuals from diverse backgrounds into online courses, resulting in a more complex online learning environment (Yu, 2022). In this context, the "Anadolum eCampus" LMS is the primary platform for course content, exam and homework tracking, and interactive activities. As of December 2, 2024, Anadolu University reported that 988,377 students were enrolled in the Open Education System for the fall 2024–2025 academic year (Anadolu University, 2024). Learners on the Anadolum eCampus LMS have access to various learning resources. This platform enables learners to interact with one another, instructors, the environment, the interface, and the content.

Satisfaction is one of the significant factors affecting the effectiveness and quality of online learning programs (Yukselturk & Yildirim, 2008). Accordingly, it would be beneficial to investigate how students with varying readiness levels in the open education system perceive the e-course materials offered on the platform. Additionally, interaction plays a crucial role in enhancing students' learning experiences (Lin & Wang, 2024). According to Transactional Distance Theory, students who interact with different elements of the learning environment are more likely to engage in effective educational transactions and, consequently, derive greater benefit from online learning (Lin & Wang, 2024). Therefore, the platform's effectiveness is shaped by learners' perceptions and experiences.

In distance education research, transactional distance and satisfaction are inherently examined together . Transactional distance captures the core challenge of the field—the psychological and communicative gap between learners and instructors—while satisfaction represents a key measurable outcome used to evaluate the quality and effectiveness of online instructional environments (Alqurashi, 2019; Gavrilis et al., 2020). The selection of these variables enables researchers to empirically test a central assumption: that reductions in perceived transactional distance—which reflect higher quality and frequency of

interaction—are directly associated with increased satisfaction. This research addresses a critical gap: contradictory findings in the literature regarding which interaction type most strongly predicts satisfaction (e.g., Alqurashi, 2019; Cho, 2011; Tuan & Lan, 2025). This variance suggests that the relationship between different forms of interaction and student satisfaction is multifaceted and context-dependent. Specifically, depending on the nature of the course and the specific characteristics of the learner group, one form of interaction may play a more significant role in predicting satisfaction. Understanding these dynamics is crucial for designing effective distance learning programs, creating course materials, and developing tutor training initiatives. Therefore, it is valuable to examine how open and distance learners' level of satisfaction with the LMS they use relates to their perceptions of transactional distance.

Research conducted at Anadolu University, which holds a prominent position in Turkey and is classified as a Giga university (Bozkurt, 2019), can make significant contributions in several areas. First, given that course materials and LMS facilities have changed since the system's inception (Aydın et al., 2023), examining open and distance learners' satisfaction with the current system warrants investigation. Thus, the research results may contribute to the development of strategies for more effective use of the Anadolum eCampus platform. Second, this research can assist instructional designers in developing various tools and content for learners. Third, it can aid system experts in enhancing the content and user interface of the platform. Ultimately, this research will significantly contribute to the theoretical underpinnings of transactional distance theory and improve open and distance learners' satisfaction with their LMS.

Research Objective

This study aims to assess the satisfaction levels of open and distance learners with the LMS, their perceptions of transactional distance, and the relationship between them. Thus, the following research questions were formulated:

- What are the satisfaction levels of open and distance learners with Anadolum eCampus LMS?
- What are the transactional distance perceptions of open and distance learners?
- Which dimensions of transactional distance significantly predict the satisfaction levels of open and distance learners with Anadolum eCampus LMS?

Conceptual Framework

Transactional Distance Theory

According to Moore (1993), transactional distance refers to the interactional distance between the learner and the teacher. This distance is not merely physical but may also create psychological and communicative gaps between teachers and students. Moore's

Transactional Distance Theory aims to enhance the effectiveness of distance learning designs by exploring how these distances impact the learning process.

Moore (1989) examined interaction across three essential dimensions: learner-content interaction, learner-teacher interaction, and learner-learner interaction. He emphasised the importance of interaction in enhancing the quality and efficiency of the learning process. Thus, interaction is not limited to online learning environments; it also occurs in face-to-face educational settings.

Zhang (2003) provides a more comprehensive evaluation of the learning process by integrating the aspects of interaction identified in Moore's study into Transactional Distance Theory. Zhang divides interaction into five main categories: Learner-Content, Learner-Teacher, Learner-Learner, Learner-Interface, and Learner-Learning Environment. This classification offers a comprehensive approach to interaction, emphasising interpersonal communication, the learning environment, and protocols for technology usage. In this respect, learners' interactions with course content, instructors, other learners, and the learning environment play a critical role in reducing transactional distance.

Learner-Teacher Interaction: This term describes the communication between students and teachers. Guidance, feedback, and motivation are essential elements of this interaction (Moore, 1989a, 1993). Teachers' encouragement of students greatly increases their involvement in online learning. Students can communicate with their teachers using the Anadolum eCampus LMS, which offers tools such as live lectures, emails, and messages.

Learner-Learner Interaction refers to the communication and collaboration that students establish with one another. Discussion boards, group projects, and virtual classroom apps help encourage this interaction (Moore, 1989b). Virtual classrooms and live chat facilitate this interaction in synchronous learning settings. For instance, during live lectures on the Anadolum eCampus LMS, students interact with their classmates and teachers via chat channels. Such an atmosphere enables students to build social relationships, to encourage the development of others' meaning structures, and to create a shared learning experience (Moore, 1989b).

Learner-Content Interaction the learner's interaction with educational materials. It covers their processes of understanding, evaluating, and applying the material (Moore, 1989b). In digital learning settings, a learner's motivation and success can be significantly influenced by their level of engagement with the content. Anadolum eCampus LMS offers a comprehensive range of materials, including eBooks (PDF, HTML5, EPUB), PDF and audio summaries of units, lecture videos, infographics, microanimations, interactive module designs, live lecture recordings, exam questions, question sets, midterm and end-of-semester practice exams, as well as interactive videos and exercises to increase learners' interaction with the content. This wide variety of resources enables learners to access information through different sensory channels, including reading, listening, watching, and

practising, and promotes active engagement with the material and deeper comprehension (Bonk & Zhank, 2006; Moore 1989b).

Learner-Interface Interaction: It refers to the learner's interaction with the e-learning platform or technological tools. The interface consists of components such as menus, buttons, links, icons, and other interactive elements that are visible on the screen. (Çakmak, 2007). The interface includes all the functional and visual elements that allow students to interact directly with the e-learning platform. (Hamutoğlu et al., 2019). This interaction comprises components such as a home page, course menus, buttons providing access to e-learning materials, navigation tools, and feedback mechanisms. To enhance learner-interface interaction, Anadolum eCampus LMS offers a user-friendly platform that is constantly improved based on learner feedback. In this context, the Anadolum eCampus LMS is intended to be user-friendly and is regularly updated to reflect user feedback.

Learner-Learning Environment Interaction: It refers to the learner's interaction with the digital or physical environment. This interaction encompasses the learner's feelings of belonging, harmony, and commitment within e-learning environments (Burnham & Walden, 1997). Anadolum eCampus LMS strengthens this interaction by providing learners with a rich learning environment. This platform provides learners with a wide array of educational materials and interaction tools.

Satisfaction with the LMS

Learner satisfaction, as defined by Astin (1993), refers to the perceived value of the learner's experiences in an educational environment. Paechter et al. (2010) highlight that flexibility in learning processes and the exchange of information among peers positively affect satisfaction. Moreover, learners' e-learning experiences and expectations influence their achievements and course satisfaction. Thus, learner satisfaction influences learning outcomes in online learning (Lin & Wang, 2024) and is a key determinant of the process's success.

The literature reports mixed findings regarding the relationship between learner satisfaction and interaction dimensions. Sher (2009) found that students' satisfaction levels with web-based learning were influenced by their interactions with one another and with their instructors. In another study, Cho (2011) determined that, in an online university program, learner-interface did not affect student satisfaction, whereas learner-content, learner-teacher, and learner-learner did affect student satisfaction. Alqurashi (2019) and Kuo et al. (2013, 2014) also showed that learner-content and learner-teacher interactions were predictors of satisfaction, with the learner-content interaction accounting for the highest percentage of satisfaction. Additionally, a study by Bashir (2019) indicated that students' satisfaction levels with e-learning were correlated with their interactions with the interface. Kara (2021) found that EFL students' perceptions of their satisfaction with online learning were influenced by learner-teacher, learner-learner, learner-interface, and learner-

content interactions. According to Bağrıacık Yılmaz (2023), learner-content and learner-teacher interactions predict satisfaction at a moderate level, while learner-learner interactions predict satisfaction to a lesser extent in online learning environments. In their study on online English courses, Amoush and Mizher (2023) discovered that while learner-learner and learner-content interactions were not significant indicators of satisfaction, learner-technology interaction and learner-teacher contact were significant indicators of satisfaction. Karaoglan-Yilmaz et al. (2024) found a positive relationship between transactional distance and both satisfaction and engagement in a blended learning environment. Lysitsa and Mavroeidis (2024) employed logistic regression and identified self-regulated learning and learner-tutor interaction as the main predictors of student satisfaction in the distance education environment. Tuan and Lan (2025) found that whereas learner-interface and learner-content interactions had no significant impact on student satisfaction, learner-teacher and learner-learner interactions had a significant impact. The literature indicates no consensus regarding the link between types of interaction and satisfaction in online learning environments. Consequently, the current study aims to further explore the relationship between interaction types and student satisfaction in an online learning context.

METHOD

Research Research Model

Correlational research, one of the quantitative research methods, was used in this study. First, the research model was developed to statistically examine learners' satisfaction with the Anadolum eCampus platform in the open and distance education system and their perceptions of transactional distance. Second, the model was designed to investigate the relationships between different interaction types and learners' satisfaction with the Anadolum eCampus platform and to identify which interaction types are most closely associated with satisfaction.

Participants

Based on data published by Anadolu University on December 2, 2024 (Anadolu University, 2024), The study population comprises 988,377 active learners enrolled in Anadolu University's Open Education System during the fall semester of the 2024-2025 academic year. A total of 1059 learners participated in the study using a convenience sampling method. However, as a result of normality analyses performed on the dataset, outliers were removed, and a total of 1003 learner data were included in the analysis. Table 1 presents participants' demographic characteristics, including age, gender, and program type.

Table 1

Demographic Information of Participants

Demographic	Group	n	%
Gender	Male	316	3.5
	Female	687	68.5
	Total	1003	100
Age	18-24 years	292	29.1
	25-34 years	247	24.6
	35-44 years	212	21.1
	45-54 years	167	16.7
	55 years and over	85	8.5
	Total	1003	100
Type of Program Enrolled	Undergraduate	396	39.5
	Associate degree	607	60.5
	Total	1003	100

The participants' gender distribution was 31.5% male and 68.5% female. An examination of the participants' age distribution revealed that the largest group, comprising 29.1% of the total, falls within the 18-24 age range. The other age groups are 25–34 (24.6%), 35–44 (21.1%), 45–54 (16.7%), and 55 and older (8.5%). This distribution indicates that a substantial proportion of the participants are young or adult learners. Additionally, when examining participants' programs of enrollment, 60.5% are enrolled in associate degree programs and 39.5% in undergraduate programs. Therefore, the majority of the study participants are enrolled in associate-degree programs.

Data Collection Tools

The survey consisted of three sections: the Demographic Information Form, the Anadolum eCampus System Satisfaction Questionnaire, and the Transactional Distance Scale. The researcher prepared a Demographic Information Form to collect information on the participants' gender, age, and program type.

The Anadolum eCampus System Satisfaction Survey was developed by the Learning Technologies Department at Anadolu University, and its validity and reliability were tested (Aydın et al., 2023). The survey items consist of statements that reflect learners' views of the system, their evaluations of the course, and their perceptions of the system's contributions. Participants rated each item based on a five-point Likert-type scale. The second section of the survey aimed to measure respondents' frequency of use of the course materials provided

through the Anadolum eCampus System, as well as their satisfaction with these materials. These materials were categorised under four main groups: “Read, Explore, Learn”; “Watch, Learn”; “Try, Learn”; and “Listen, Learn”. Cronbach’s alpha coefficient (α) was computed to assess the survey’s reliability; the total scale yielded a value 0.977. This value shows that the scale has a high level of internal consistency (Büyüköztürk, 2017).

The scale was developed by Zhang (2003) to measure the level of transactional distance and was later adapted into Turkish by Yılmaz and Keser (2015). The scale is a five-point Likert-type instrument consisting of 38 items. The Transactional Distance Scale comprises five subdimensions that evaluate learners' perceived interaction levels in open and distance learning environments. These sub-dimensions are: learner-interface interaction, learner-content interaction, learner-instructor interaction, learner-learner interaction, and learner-learning-environment interaction. The scale’s reliability was evaluated using Cronbach’s alpha coefficients (α): 0.789 for the learner-interface, 0.794 for the learner-content, 0.848 for the learner-teacher, 0.963 for the learner-learner, 0.850 for the learner-learning environment, and 0.939 for the overall scale. These values demonstrate a sufficient degree of reliability (Büyüköztürk, 2017).

Data Collection and Analysis

Students who were actively enrolled in the Anadolu University Open Education System during the autumn semester of the 2024–2025 academic year could access the survey via Google Forms. In accordance with ethical standards, all participants provided written informed consent, and participant privacy was carefully protected. Descriptive and predictive statistical tests were used to analyse the data. In this context, descriptive statistics were used to address the first and second research question, correlation analyses and multiple regression analyses were conducted to answer the third research question.

Ethical considerations

Ethics committee approval to conduct the study was obtained from the Afyon Kocatepe University Scientific Research and Publication Ethics Committee.

Ethical Review Board: Afyon Kocatepe University Scientific Research and Publication Ethics Committee

Date of Ethics Review Decision: November 11, 2024

Ethics Assessment Document Issue Number: 2024/50

RESULTS

A frequency analysis was carried out to identify the preferred e-learning materials in the LMS among open and distance learners. The findings are presented in Table 2.

Table 2

Distribution of Open and Distance Learners' Use of e-Learning Materials in the LMS

e-Learning Material	1st Preference	2nd Preference	3rd Preference	4th Preference
Listen Learn	78	104	193	628
Try Learn	152	361	368	122
Read Explore Learn	409	202	216	176
Watch Learn	364	336	226	77

Table 2 shows that Read-Explore-Learn materials are the most preferred first-choice materials (f = 409). Watch-Learn materials closely follow as the first choice and are also frequently selected as the second choice. Moreover, Try-Learn materials are preferred as the second choice (f = 361) and the third choice (f = 368). Lastly, Listen-Learn materials are the fourth most preferred choice (f = 628).

A Frequency analysis was conducted to determine open and distance learners' satisfaction levels with e-learning materials. The findings are demonstrated in Table 3.

Table 3

Distribution of Open and Distance Learners' Satisfaction Regarding e-Learning Materials

e-Learning Material	1st Preference	2nd Preference	3rd Preference	4th Preference
Listen Learn	79	120	202	602
Try Learn	194	336	343	130
Read Explore Learn	404	212	200	187
Watch Learn	326	335	258	84

Read-Explore-Learn materials (f = 404) were the most preferred and the most satisfying, as indicated in Table 3. The Try-Learn materials ranked second and third in satisfaction (f = 336 and f = 343, respectively), while the Listen-Learn materials ranked fourth (f = 602).

Descriptive statistics were used to assess open and distance learners' satisfaction with the Anadolum eCampus LMS and their perceptions of transactional distance. The results of the analysis are presented in Table 4.

Table 4

Descriptive Statistics of Open and Distance Learners' Satisfaction with Anadolum eCampus LMS and Their Perceptions of Transactional Distance

Scale	Factor	$\overline{X}$	*SD*
Satisfaction scale	Satisfaction	4.24	.92
Transactional Distance Scale	Transactional Distance	3.47	.70
	Learner-Interface	3.99	.74
	Learner-Content	3.61	.76
	Learner-Teacher	3.57	.91
	Learner- Learner	2.91	1.14
	Learner-Learning Environment	3.27	.94

Table 4 shows that open and distance learners are generally satisfied with the Anadolu University eCampus LMS. This favourable perception may be due to the system's contributions to their learning experience.

Learners' perceptions of transactional distance in online learning are generally moderate, with a mean value of 3.47. Among the sub-factors, the Learner-Interface factor had the highest score, indicating that students find the operation of the technical infrastructure in online courses sufficient and are able to utilise it effectively. The Learner-Teacher factor, with a mean of 3.57, suggests that teachers help and support students. The mean value of 3.61 for the Learner-Content factor indicates that learners' perceptions of the academic worth of the course material are moderate. Additionally, the mean score of 3.27 for the Learner–Learning Environment can be interpreted to indicate that learners somewhat enjoy online learning. The mean score for the lowest dimension, the Learner-Learner factor, was 2.91, suggesting that learners' interaction and communication remain quite limited. Overall, the findings indicate that perceptions of interface and instructor support are strong, perceptions of the online learning environment and content are moderate, and perceptions of learner interaction are relatively low.

A Pearson correlation analysis was conducted to determine the relationship between open and distance learners' satisfaction with the Anadolum eCampus LMS and their transactional distance. The findings are presented in Table 5.

Table 5

Pearson Correlation Analysis Results

Factors	1	2	3	4	5	6
1. Learner-Interface	1					
2. Learner-Content	.532**	1				
3. Learner-Teacher	.460**	.506**	1			
4. Learner- Learner	.292**	.426**	.529**	1		
5. Learner-Learning Environment	.472**	.541**	.609**	.962**	1	
6. Satisfaction scale	.570**	.612**	.481**	.365**	.528**	1

**$p<.01$.

The analysis indicates significant, positive relationships between learners' satisfaction and all dimensions of transactional distance (interface, content, teacher, student, and environment). All relationships were statistically significant and of moderate strength, indicating an association between higher satisfaction levels and greater interaction in these areas. A multiple regression analysis was conducted to identify the factors that predict learners' satisfaction with the Anadolum eCampus LMS. To assess multicollinearity, correlations among the independent variables (all < 0.80), variance inflation factors (VIF values < 10), and tolerance values (> 0.20) were examined. All these metrics were within acceptable ranges (Büyüköztürk, 2017).The analysis results are depicted in Table 6.

Table 6.

Multiple Regression Analysis Results

Factor	*B*	*Standard Error*	*β*	*t*	*p*
Constant	.592	.124		4.763	.000
Learner-Interface	.338	.035	.273	9.651	.000

Learner-Content	.405	.036	.335	11.294	.000
Learner-Teacher	.090	.031	.090	2.937	.003
Learner-Learner	-.027	.026	-.034	-1.054	.292
Learner-Learning Environment	.182	.035	.187	5.154	.000

Significant relationships exist between some dimensions of transactional distance perception and satisfaction ($R = .700$, $R^2 = .49$, $p < .001$). These variables account for approximately 49% of the variance in satisfaction. According to the standardised regression coefficients (β), the order of importance of the predictors for satisfaction is: Learner-Content Interaction (β = 0.335), Learner-Interface Interaction (β = 0.273), Learner-Environment Interaction (β = 0.187), Learner-Teacher Interaction (β = 0.090), and Learner-Learner Interaction (β = -0.034). Regression coefficients indicated that Satisfaction was significantly predicted by all factors except Learner-Learner Interaction.

DISCUSSION

This study investigated open and distance learners' satisfaction with e-learning materials and the relationship between their satisfaction perceptions and transactional distance with respect to the Anadolum eCampus LMS. The study found that the most preferred and most satisfying e-learning materials for open and distance learners in the Anadolum eCampus LMS were e-books, unit summaries, infographics, and interactive content in the 'Read-Explore-Learn' category. These materials are likely to facilitate cognitive processing by allowing students to engage with the subject matter at their own pace. Additionally, the least preferred and least satisfying e-learning materials were the audiobooks and audio summaries in the Listen-Learn category. This finding suggests that passive auditory content may not suit this learner group's requirements or preferences. Overall, these results indicate that learners are more interested in text-based and visual materials than in audio materials.

Students' satisfaction with Anadolum eCampus was high, indicating that they found the system useful and that it effectively supported their educational experiences. This result is supported by previous research (Kara, 2021; Kuo et al., 2013). Moreover, this result aligns with the systematic monitoring studies conducted by Anadolu University. Findings from the Anadolum eCampus Satisfaction Survey, administered every semester since the 2015–2016 school year, indicate that students' satisfaction with the system has increased over time.

The reports showed that satisfaction levels were higher in the 2021-2022 academic year than in previous years. Additionally, the platform's updates and improvements have enhanced the learning experience for students, as user satisfaction is linked not only to content quality but also to the platform's technical functionality, interaction opportunities, and usability. Al-Fraihat et al. (2020) found that satisfaction with LMSs was significantly related to structural elements, such as system quality, service quality, and information quality. As a result, it can be inferred that students benefit from the system in their learning and have positive views of it.

The study results indicate that students perceived a moderate level of transactional distance. Learner-interface interaction had the highest mean score, while learner-learner interaction had the lowest mean score. Gökoğlu et al. (2024), Kara (2021), Özbey and Kayri (2023), and Murad et al. (2025) found that students had moderate perceptions of transactional distance. According to the Transactional Distance Theory (Moore, 1993), when students engage in positive interactions during learning, they benefit more from online learning. Thus, the online learning environment may offer students various interactive opportunities to positively enhance their perceptions of transactional distance. In this context, despite their limited peer interactions, students may find it easy to use, access, and study instructional resources; feel encouraged by their teachers; and participate in the learning environment.

Another study found a significant positive relationship between the students' satisfaction with Anadolum eCampus LMS and their perceptions of transactional distance. As students' satisfaction levels increase, they feel more engaged in the learning process. Thus, this result is consistent with Moore's (1993) Transactional Distance Theory. In other words, students' satisfaction tends to increase as they interact with the content, the interface, the learning environment, the teacher, and other students. According to research by Mbwesa (2014), factors such as access to content and teacher-student interactions improved the learning process by reducing psychological distance. Regarding these positive relationships, the multiple regression results indicated that the satisfaction levels of open and distance learners with the Anadolum eCampus LMS were significantly predicted by certain factors related to transactional distance.

Among the five interaction factors, learner-content interaction had the most substantial impact on students' satisfaction with the system, aligning with previous studies (Alqurashi, 2019; Bağrıacık Yılmaz, 2023). Anadolum eCampus LMS provides a wide range of educational materials. These materials improve engagement and promote active learning by providing students with access to knowledge via multiple sensory modalities, including reading, listening, watching, and practicing (Bonk & Zhang, 2006; Moore, 1989b). Accordingly, students' satisfaction levels may be affected by how they interact with the course material, including constructing their understanding, solving problems, and relating new information to what they already know (Chen, 2023).

Learner-interface interaction positively and significantly predicted students' satisfaction with the Anadolum eCampus LMS. Such studies, conducted by Amoush and Mizher (2023), Karaoglan-Yilmaz et al. (2024), and Kara (2021), confirm this result. Learner-interface interaction serves as a bridge, enabling students to access and engage with technology easily and effectively (Pandita & Kiran, 2023). In the current study, the platform's usability and design features, including the home page, course menus, buttons that provide access to e-learning materials, navigation tools, and feedback mechanisms, were identified as significant determinants of students' satisfaction with the platform.

Another significant positive predictor of students' satisfaction with the LMS was the interaction between the learner and the learning environment. A recent study by Karaoglan-Yilmaz et al. (2024) found that the interaction between the learner and the learning environment predicted course satisfaction in the flipped learning context. Students are more likely to have a positive perception of the platform and online learning when interacting effectively with their learning environment, which, in turn, increases their satisfaction with the LMS.

The learner-instructor interaction positively influenced students' satisfaction with the LMS, which supports the findings of Benli and Kara (2025), Amoush and Mizher (2023), Kuo et al. (2013), Kuo et al (2014), and Alqurashi (2019). Compared to other variables, the effect of learner-teacher interaction on satisfaction was relatively minor. In the current study context, instructors may provide feedback during live classes and utilise various tools, such as chat, email, and forums, to communicate and interact with students. Consequently, these interactional behaviours may influence their satisfaction levels with the LMS.

Learner-learner interaction did not predict students' satisfaction with the LMS. This result is consistent with previous research (Alqurashi, 2019; Kuo et al., 2013, 2014) but contradicts other studies (Bağrıaçık Yılmaz, 2023; Cho, 2011; Kara, 2021; Tuan & Lan, 2025). Students might engage in limited activities to communicate and interact with their classmates, such as group work or discussions. Thus, this interaction was not related to satisfaction with the LMS. The regression analysis suggests that developing learner satisfaction requires a supportive learning environment, a user-friendly interface, and high-quality content.

LIMITATIONS AND RECOMMENDATIONS

This study has several limitations. First, the study group is limited to a single institution and a single LMS, which may reduce generalizability. Future studies may compare users' perceptions of LMSs across institutions. Second, only self-reported measures were used to gather data, which may not accurately reflect students' real experiences. Thus, future studies can employ qualitative or mixed-methods approaches to gain deeper insights into the topic. Finally, data were gathered during a specific period, which may not capture changes in perceptions over time. Future research may employ a longitudinal approach to

further understand how perceptions of transactional distance influence satisfaction over time.

The study's results provide practical recommendations for open and distance learning settings to enhance student satisfaction and reduce perceived transactional distance. First, the accessibility of "Listen-Learn" content (audiobooks and audio summaries) that received lower satisfaction ratings needs to be improved. Additional features, such as word emphasis, modification of content speed, and relevant examples, may be included. Second, the visibility and accessibility of the most preferred learning materials (interactive content, exercises, and trials) in Anadolum eCampus can be improved, because students commonly use them. Third, because enhancing communication between teachers and students is crucial for reducing transactional distance, asynchronous messaging and frequent, personalised feedback may be beneficial. Fourth, it is recommended to incorporate instructional activities, such as discussion boards, cooperative group projects, and synchronous activities, into courses to foster student collaboration and communication. Moreover, avatar-based user profiles, brief introductory sessions, or on-campus digital events can help students feel more socially connected in online courses. Finally, to better serve students from diverse demographic backgrounds, the LMS interface can be enhanced with gamified elements, streamlined navigation, and visual feedback tools.

CONCLUSION

This study investigated how open and distance learners perceived transactional distance as well as their preferences for and levels of satisfaction with various e-learning resources and the Anadolum eCampus LMS. The findings indicate that students prefer more interactive and cognitively stimulating resources, such as Read-Explore-Learn and Try-Learn, to passive resources such as Listen-Learn. Students expressed high satisfaction with the LMS, whereas their perceptions of transactional distance were moderate. Satisfaction was strongly predicted by the Learner–Content, Learner–Interface, Learning Environment, and Learner–Teacher variables, whereas peer-to-peer interaction did not contribute significantly.

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Data Availability Declaration

While the primary datasets utilised in this study are not publicly accessible due to certain constraints, they are available to researchers upon a formal request. The authors have emphasised maintaining the integrity of the data and its analytical rigor. To access the datasets or seek further clarifications, kindly reach out to the corresponding author. Our aim is to foster collaborative academic efforts while upholding the highest standards of research integrity.

Author Contributions

Havva Buhan was responsible for conceptualization, methodology, formal analysis, investigation, resources, data curation, and writing the original draft. Erhan Ünal contributed to conceptualization, writing the original draft, reviewing and editing the manuscript, and provided supervision.

Author(s)' statements on ethics and conflict of interest

Ethics statement: We hereby declare that research/publication ethics and citing principles have been considered in all the stages of the study. We take full responsibility for the content of the paper in case of dispute.

Statement of interest: There is no conflict of interest in this study.

Funding: Not applicable

Acknowledgements: No funding or financial support of any kind was received by the authors for the study.

Biographical notes:

Havva Buhan: Havva Buhan received her master's degree in Internet and Information Technology Management from Afyon Kocatepe University, in Türkiye. She is currently working in the Open Education Faculty at Anadolu University. Her research interests focus on online learning and the design of instructional materials.

Scopus Author Identifier Number: N/A

Web of Science Researcher ID: N/A

Google Scholar Researcher ID: N/A

Erhan ÜNAL[4]**:** Erhan Ünal is an associate professor at the Department of Educational Sciences at Afyon Kocatepe University, Türkiye. He received his PhD degree in Computer Education and Instructional Technology from Gazi University in Turkey. His research interests are instructional design, collaborative technologies and constructivist teaching and learning methods.

Scopus Author Identifier Number : N/A

[4] Corresponding Author

Web of Science Researcher ID : JNR-1331-2023

Google Scholar Researcher ID:

https://scholar.google.com/citations?user=zIAcAkUAAAAJ&hl=tr&oi=ao