

RESEARCH PAPER

Understanding the technical and social paradoxes of learning management systems usage in higher education: A sociotechnical perspective

Mohammed Ali¹  | Trevor Wood-Harper² | Bob Wood²

¹Salford Business School, University of Salford, Maxwell Building, University Rd, Salford, M5 4WT, UK

²Alliance Manchester Business School, University of Manchester, Booth St W, Manchester, M15 6PB, UK

Correspondence

Mohammed Ali, University of Salford, Salford Business School, Maxwell Building, University Rd, Salford M5 4WT, UK.

Email: m.b.ali2@salford.ac.uk

Abstract

The recent COVID-19 pandemic has created an unprecedentedly complex situation and wicked problem in the education domain. This has forced educators and learners to study from home using unfamiliar pedagogical typologies and technologies in order to adapt to the new work routine. This research contributes to theory and practice by adopting a sociotechnical approach (STS) to understand the technical and social implications of learning management systems (LMS) to inform pedagogical development. A qualitative approach is adopted, and semi-structured interviews are conducted across two university cases with 40 academics and students to capture their perceptions of LMS usage. We found that technical paradoxes present a barrier to pedagogical development in the transition from blended learning environments to remote ones, where many wicked and unprecedented challenges emerge from learning remotely during a pandemic, while social paradoxes arise from cultural issues such as user resistance that impede the university's pedagogical goals and visions.

KEYWORDS

higher education, learning management system, pedagogy, sociotechnical theory

1 | INTRODUCTION

In the twenty-first century, significantly innovative approaches to learning are distinguished by using learning management systems (LMS) (Teo et al., 2019). Students, lecturers, faculty members and administrators, to name a few stakeholders, find the technical and social affordances of LMS to be very appealing. Consider the benefits offered by LMS, such as enhanced information accessibility, support for various learning styles and

preferences, standardisation of content, increased convenience, resilience in achieving and assessing learning outcomes, cost effectiveness, fostering collaborative and autonomous learning, knowledge construction, sharing and interactivity, albeit at a lower cost, to illustrate this (Mohammadi et al., 2021). The recent COVID-19 pandemic has caused a significant paradigm shift in pedagogical models, which is evident in the quick changes educational environments have undergone as a result. Schools and campuses have been closed, social distance

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has become widely practiced, and home quarantines have been implemented in an effort to stop the COVID-19 spread (Robbins et al., 2020). Educators are currently required to adopt LMS in every aspect of their pedagogical practice in order to allow students to resume their degrees during these unprecedented times. The question of whether the factors influencing LMS usage prior to the coronavirus crisis are different from those influencing it during and after the crisis has arisen as a result of this.

The extreme pandemic conditions around the world have increased the need for paradigm shifts in the way that education is delivered. The current study was motivated by a number of issues and factors. First, the high transmissibility of the COVID-19 outbreak has posed significant challenges for higher education institutions (HEIs) and other stakeholders, necessitating the closure of campuses as pandemic containment measures. As a result, online learning environments have taken the place of conventional classrooms for teaching and learning (Käpplinger & Lichte, 2020). Second, the unanticipated shift from blended learning models to online learning entirely mediated by sophisticated digital, pervasive information and communication technologies with LMS platforms serving as the sole educational medium has been brought on by the COVID-19 spread (Batdi et al., 2021). The current study contends that a sudden shift to online learning during the pandemic raises crucial and unprecedented contextual issues regarding the use of technical systems like LMS by social actors like students and academics. This is due to the unique nature of the pandemic situation, its pervasiveness and the enormous impact it has had on higher education.

To this end, the current study has proposed an integrated model that incorporates sociotechnical theory (STS). STS acknowledges that it is crucial to optimise both technical and social factors in the event of designing and operating a new system and that changing one component of a system will inevitably require modifications to other components, and thus to maximise success, the system should be evaluated holistically (Baxter & Sommerville, 2011; Carayon, 2006; Cherns, 1987; Clegg, 2000; Davis et al., 2014; Mumford, 2006; Pasmore, 1995; Sarker et al., 2019; Trist & Bamforth, 1951; Waterson et al., 2015). An STS approach bears the potential to explore a system change whereby a pandemic has shifted the landscape of higher learning from a blended approach to a purely remote approach to learning that relies on LMS usage in a home environment and, in turn, has impacted the pedagogical development of academics and students. Throughout this research, the terms “pedagogy” and “pedological” refer to learning and teaching models and practices of HEIs, and the term “LMS” refers to existing systems HEIs have already

implemented and are driven by ubiquitous technologies and devices to facilitate pedagogical practices (Sutjarittham et al., 2019).

There has been considerable research on the use of LMS in higher education (Liu et al., 2020; Martins et al., 2019; Turnbull et al., 2021; Veluvali & Suriseti, 2021), but few studies have taken advantage of using complex LMS in pedagogical practice from a technical and social perspective. We already know LMS can facilitate pedagogical practice, yet there are other issues overlooked in the literature, namely the organisational and personal paradoxes affecting the attainment of pedagogical needs. Hence, there is a need to study how LMS impacts pedagogical development, not solely as a technical system but also as one that has social considerations that are reinforced by both social and technical structures, as is argued throughout the paper.

The primary goals of this paper are threefold: (1) to acknowledge that academics and students must adopt a completely new virtual alternative approach to studying the curriculum, (2) to analyse LMS usage among academics and students and (3) to explain the technical and social overlap in an integrated theoretical model. The effectiveness of change interventions in complex situations can be greatly enhanced by the application of systems ideas in conjunction with frameworks (Chowdhury, 2022). Hence, we contribute by determining that the technical and social perspectives of our STS approach have overlapping relevance for both students and academics who interact with LMS to facilitate pedagogical practices. Thus, we endeavoured to answer the following research questions:

RQ: How does a sociotechnical approach help to understand the impact of LMS on pedagogical development through a technical and social lens?

SRQ1: *What are the technical challenges of LMS usage impacting pedagogical development?*

SRQ2: *What are the social (organisational and personal) paradoxes affecting the attainment of academics and students' pedagogical needs in HEIs?*

The remaining portions of this paper are structured as follows: we first offer a succinct review of the literature and then a discussion regarding the development of our STS research model. The procedures and justifications for data collection and analysis are then covered in the methodology section. In the results section, conclusions based on data analysis are presented in response to the research questions. The results are then explained in the discussion section in terms of literature, theory and the research's setting. The conclusion of the paper will include theoretical and practical implications, suggestions for future research topics and the study's limitations.

2 | RELATED WORK

Different theoretical frameworks have been used to investigate LMS use in higher education (Liu et al., 2020; Martins et al., 2019; Turnbull et al., 2021; Veluvali & Suriseti, 2021). LMS usage models have included social and technical information system characteristics in addition to sociotechnical constructs (Huang et al., 2019). LMS usage has been examined simultaneously from the perspectives of two macro-paradigms, which are user satisfaction and technology acceptance (Al-Fraihat et al., 2020; Alharbi & Drew, 2014). Two research streams—initial adoption and post adoption—have both been used to examine how people use technology (Chavoshi & Hamidi, 2019).

The COVID-19 pandemic in 2020 will present unprecedented challenges, which will spur research interest in how e-learning affects the provision of education (Käpplinger & Lichte, 2020). In response to the end of face-to-face instruction, educators have embraced distance learning strategies ranging from online educational materials to simulations. Online learning options are now part of an inclusive instructional design called the Universal Learning Design (ULD), according to recent research. The use of LMS as a unified pedagogical framework within a more diverse ULD, however, has only occasionally been successful (Dickinson & Gronseth, 2020).

While some studies have attempted to shed light on the difficulties educators encounter when implementing e-learning under emergency conditions (Almaiah et al., 2020; Al-Nuaimi et al., 2022), there is a lack of awareness of the impact of e-learning systems, such as LMS usage, on pedagogical development during a pandemic, which has only been studied in pre-pandemic learning environments (Alharbi & Drew, 2014; El-Masri & Tarhini, 2017). Nevertheless, the literature has cited some macro (external), micro (internal) and miso (individual) concerns among faculty, ranging from potential board exam delays to inadequate awareness of and training on leveraging technology (AlGaeed et al., 2020). These concerns are, however, of little significance to pedagogical development. Therefore, this related work has revealed a theoretical gap based on insufficient research studies that evaluate the effectiveness of LMS on pedagogical development during a pandemic from the perspective of the most important category of stakeholders in higher education, namely social actors such as academics and students. We employ sociotechnical theory (STS) to provide a broader lens of the LMS' impact on pedagogical development as there are both technical and social factors at play.

3 | SOCIOTECHNICAL SYSTEMS (STS) APPROACH

Researchers and practitioners have been developing and using sociotechnical systems theory internationally for about 60 years (e.g., Avison et al., 2006; Baxter & Sommerville, 2011; Carayon, 2006; Cherns, 1987; Clegg, 2000; Davis et al., 2014; Horton et al., 2005; Mumford, 2006; Pasmore, 1995; Sarker et al., 2019; Trist & Bamforth, 1951; Waterson et al., 2015). The general philosophy, which covers the collaborative design and optimisation of organisational systems (including both social and technical components), has maintained its practical relevance and is gaining acceptance among audiences outside the social sciences (Eason, 2008, 2014). These accomplishments can be partially attributed to the theory and practice of sociotechnical systems, which are still developing. According to sociotechnical systems theory, when creating and running any new system, it is essential to optimise both technical and social factors (Cherns, 1987). To maximise success, the system should be evaluated holistically because changes to one component of a system will inevitably require changes to other components (Clegg & Shepherd, 2007). Consequently, it is necessary to view and consider all the following: people, processes and procedures, goals, culture, technology and buildings and infrastructure. The sociotechnical systems framework developed by Davis et al. (2014), which includes these elements, served as the model for our framework (see Figure 1).

Leavitt (1965), who developed a framework centred on the relationships between people, tasks, structures and technologies because of his experience implementing organisational change, served as the foundation for Davis et al.'s (2014) STS framework. Leavitt (1965) made the case that these system elements are interdependent and must be considered. This framework was expanded by Davis et al. (2014) to include six interdependent elements that are part of an external environment: people, processes and procedures, goals, culture, technology, buildings and infrastructure (Challenger & Clegg, 2011). According to the main idea, any complicated organisational system can be represented as a hexagon (see Figure 1). Furthermore, when viewed as a whole, it is highly unlikely that any individual or group will be able to comprehend all the system's components. As a result, the system should involve numerous parties with a variety of complementary knowledge and skills, in our case, students, academics, faculty and administrators, or parties with an interest in learning management systems (LMS) (Clegg, 2000). End-user involvement and ownership in system design and implementation are essential (Mumford, 2006).

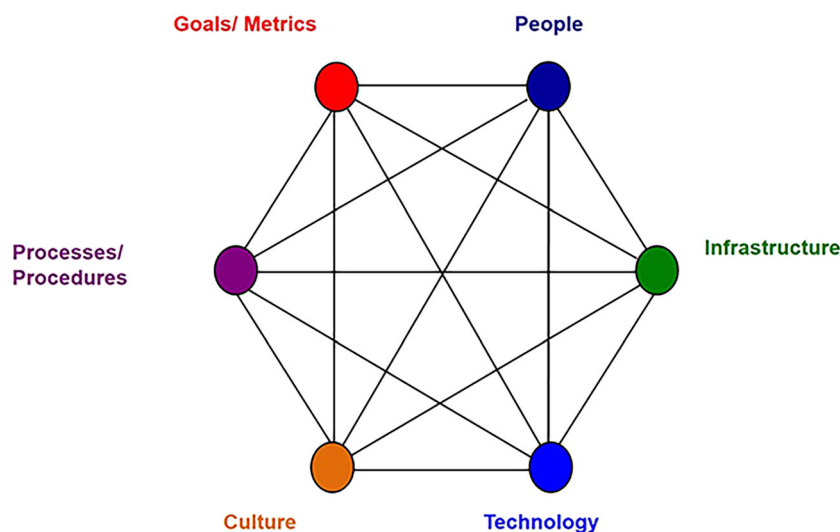


FIGURE 1 STS Framework (Davis et al., 2014). [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

Our research indicates that pedagogy does not occur in a purely technical setting; rather, people are both subjects and objects of pedagogical practice, and as a result, they encounter higher-level repercussions. However, a purely social framing might also be ineffective if it neglects to consider how the suggested social solutions relate to the technical system, or in our case, the effect of the LMS on the development of pedagogy. The intricate interdependence between the social and technical facets of pedagogical development requires an ecosystem-based viewpoint. The sociotechnical perspective, which is based on the sociotechnical vision of Davis et al. (2014), has the potential to produce comprehensive solutions that integrate technical and social perspectives to look at how LMSs facilitate pedagogical practices, including people, processes and procedures, goals, culture, technology and physical structures and infrastructure. According to Mumford (2006), organisations can be seen as dynamic and open systems, with elements constantly entering, interacting and/or leaving over time. As a result, an organisational system's distinctiveness is derived from the traits of the people who actively participate in it and interact with it daily.

The social and technical axes of LMS covered in the recent literature allude to the social aspects of using learning technologies and the impact of the technology on student learning, such as students' engagement (Nkomo et al., 2021), feedback (Woods, 2022), monitoring attendance (Mörtzell, 2022) and students' identity (Kwon et al., 2021). Consequently, the technical and social axes inform how effectively LMS usage supports the development of pedagogical typologies to meet the pedagogical requirements of social actors (e.g., academics and students). In accordance with constructionism's quest for profound, locally contextualised qualitative

insight into the actions and interpretations through which realities are constructed, our theoretical approach determined that universities would be studied as a detailed case study. The sociotechnical approach is used in the design of the in-depth case study's unit of analysis to develop theory. Our STS theoretical model, shown in Figure 2, served as a guide for carrying out our in-depth case study.

4 | METHODOLOGY

A qualitative case study with the support of semi-structured interviews was employed for the current study. The case study approach builds on the constructivist methodology as well as our STS approach inspired by Davis et al. (2014). Our case selection is based on multiple in-depth and embedded cases (Flyvbjerg, 2013; Yin, 2018) to develop theory for an existing problem situation and align with STS theory, that is, evaluating the impact of LMS usage on pedagogical development in two university settings from a technical and social perspective. Our case study approach would help to gather a rich dataset to support our empirical findings.

The case universities are based in the United Kingdom. Although the initial locations were meant to be several schools, including business, law and engineering, these were studied virtually given the pandemic lockdown restrictions that were imposed while this study was conducted. The case selections were based on the need to collect both technical and social data from pedagogical institutions that had transitioned to virtual modes of learning using LMS as their primary learning platform in the wake of the 2020 COVID-19 pandemic. Hence, the universities provided us with an appropriate

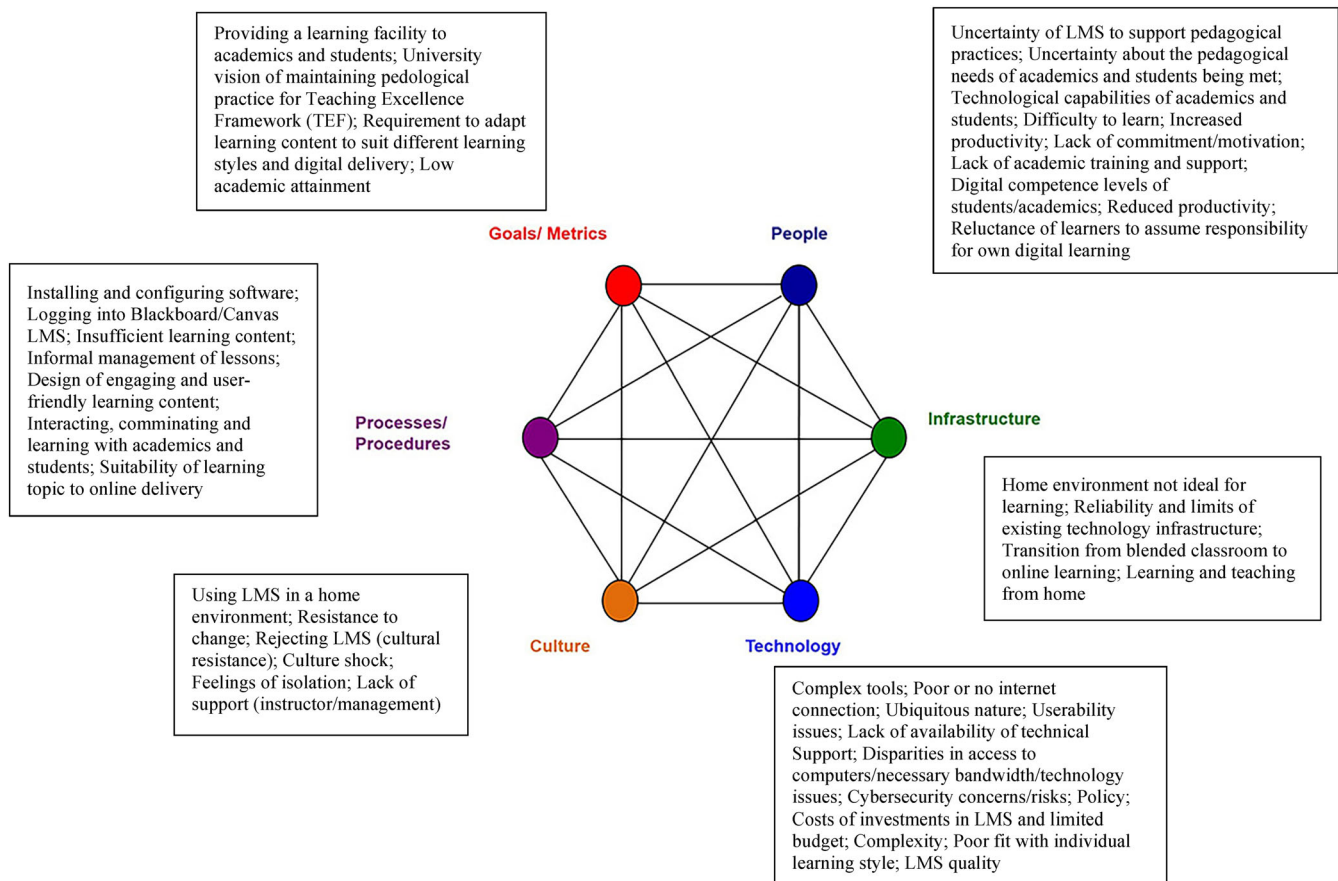


FIGURE 2 Adapted STS framework for understanding the technical and social paradoxes of LMS usage for pedagogical development (inspired by Davis et al., 2014). [Colour figure can be viewed at wileyonlinelibrary.com]

contextual premise to conduct a study on informing the effects of LMS on pedagogical development during a pandemic.

Key university stakeholders or social actors who are users of LMS, i.e., national and international students (on campus or distance learners studying either a foundation, bachelor's or master's course), and academics (lecturers, course leaders, school directors and directors of teaching) of two technical universities situated in the United Kingdom, were interviewed. Table 1 summarises the interviewees tied to each case. Appendix 1 provides a breakdown of the interviewees' profiles, namely their role, learning environment (school or department), years of study or experience and education level or qualification.

The two years of data collection included a total of 12 weeks spent on location. Interviews were conducted with 40 people (academics and students) from 40 different universities as a result (20 in case 1 and 20 in case 2). Interviews were conducted during the height of the pandemic in Q4 of 2020 and Q1 and Q2 of 2021. Both cases reflect an existing LMS, specifically VLEs (Case 1: Canvas; Case 2: Blackboard). The rationale for the sample

TABLE 1 Summary of participant cases.

No.	Participant	Participant code
University A (Canvas)		
UA1-12	Students	ST1-12A
UA13-20	Academics	T1-8A
University B (Blackboard)		
UB21-35	Students	ST1-15B
UB1-36-40	Academics	T1-5B

size is based on the recommendation of Creswell and Creswell (2018), who claim that a suitable number of interviews for each case is 20-30. In our case, 20 participants represented each case, leading to a total sample size of 40. The interviews took an average of 45 minutes, with some lasting as little as 30 minutes and up to 1 hour. The duration of the interviews is summarised in Table 2.

Over 50 internal documents were also examined, including university reports, newsletters and presentations and 40 weekly summaries of external news items provided case context. Table 3 summarises the documentation tied to each case.

TABLE 2 Participant interview duration.

Participant code	Role	Hours interviewed
University A (Canvas)		
ST1-12A	Students	7 hrs interviews 2 hr discussion
T1-8A	Academics	5 hrs interviews 1 hr discussion
University B (Blackboard)		
ST1-15B	Students	8 hrs interviews 3 hr discussion
T1-5B	Academics	3 hrs interviews 1 hr discussion

TABLE 3 Summary of case study documentation.

No.	Code	Description
University A (Canvas)		
Doc1	D1A	Teaching policy
Doc2	D2A	ICT/E-learning policy
Doc3	D3A	University reports
University B (Blackboard)		
Doc4	D1B	Teaching policy
Doc5	D2B	ICT/E-learning policy
Doc6	D3B	University reports

The interviews were conducted using video conferencing tools such as Zoom, Skype and Go-to-Meeting. The interviews were captured by directly contacting the universities via email. Therefore, our choice of conducting a multiple embedded case study is to explore LMS employed within two universities and capture the participants' perceptions of this phenomenon as part of our contribution to theory and practice. A multiple embedded case study is also justified by the need to explore more than one university, as universities have differing pedagogical goals and visions, as well as different learning management systems.

Data collected through interviews was analysed qualitatively using thematic analysis. This method was adopted as it is the most common qualitative approach used for analysing interview data and helps to gain a more in-depth perspective or opinion about the topic under examination (Fugard & Potts, 2015). Themes were developed and coded using a software tool known as Nvivo (see Figure 3), following an inductive data analysis process as data was collected and collated.

5 | FINDINGS

Our findings are presented in the form of key themes deduced from the thematic analysis of the interview data. These reflect the experiences of academics and students using existing LMS (i.e., canvas and blackboard) to support pedagogical practices during a pandemic. The key findings reflect the themes derived from our STS approach. Table 4 summarises some of the key findings from each perspective, which helped to formulate our first-order concepts and second-order themes.

5.1 | Technical challenges of LMS usage

Technical challenges refer to not only the impacts of LMS as a technology but also the processes and practices associated with it that impact pedagogical outcomes. Despite some students and lectures advocating for the benefits of LMS such as promoting system autonomy, convenience and mobility of LMS (Canvas and Blackboard) and the ubiquitous nature of campus solutions as also confirmed by the university's IT policy [T2A, pg 4, 1–2; ST5, 10, 13B; ST5B, pg 6, 6–8; ST10A, pg 10, 11–13; D1B, p1, 2–3; ST15B, pg 7, 11–13; ST11-15B; T1A, pg 4, 11–14; T3A, pg 5, 15–17], a number of barriers arose.

Lecturers agreed that the technical challenges of the LMS are one of the most important issues that must be addressed, as they could prevent many students from adopting the system (**process and procedures**). Lecturers stated,

“The usability, accessibility, and quality of the LMS website service are all potential issues for the current LMS [Canvas].” [T2A, pg 4, 1–2].

Another lecturer stated,

“... it is evident that when students perceive an LMS to be user-friendly and simple to operate, they believe the system is beneficial and will improve their performance. Hence, LMS should be designed to meet the learning needs of students.” [T3A, pg 5, 15–17].

The e-learning system must also be simple to use for students to be proficient in using it (**culture**), according to lectures. They stated,

“There is a problem with some students finding the LMS challenging to use at home because of the different educational levels among students, such as having connectivity issues during lectures or their computers freezing. The university is therefore looking into every solution that could make the system more user-friendly, as this element is crucial in enhancing performance and enabling students to recognise its value.” [T5A, pg 7, 20–21].

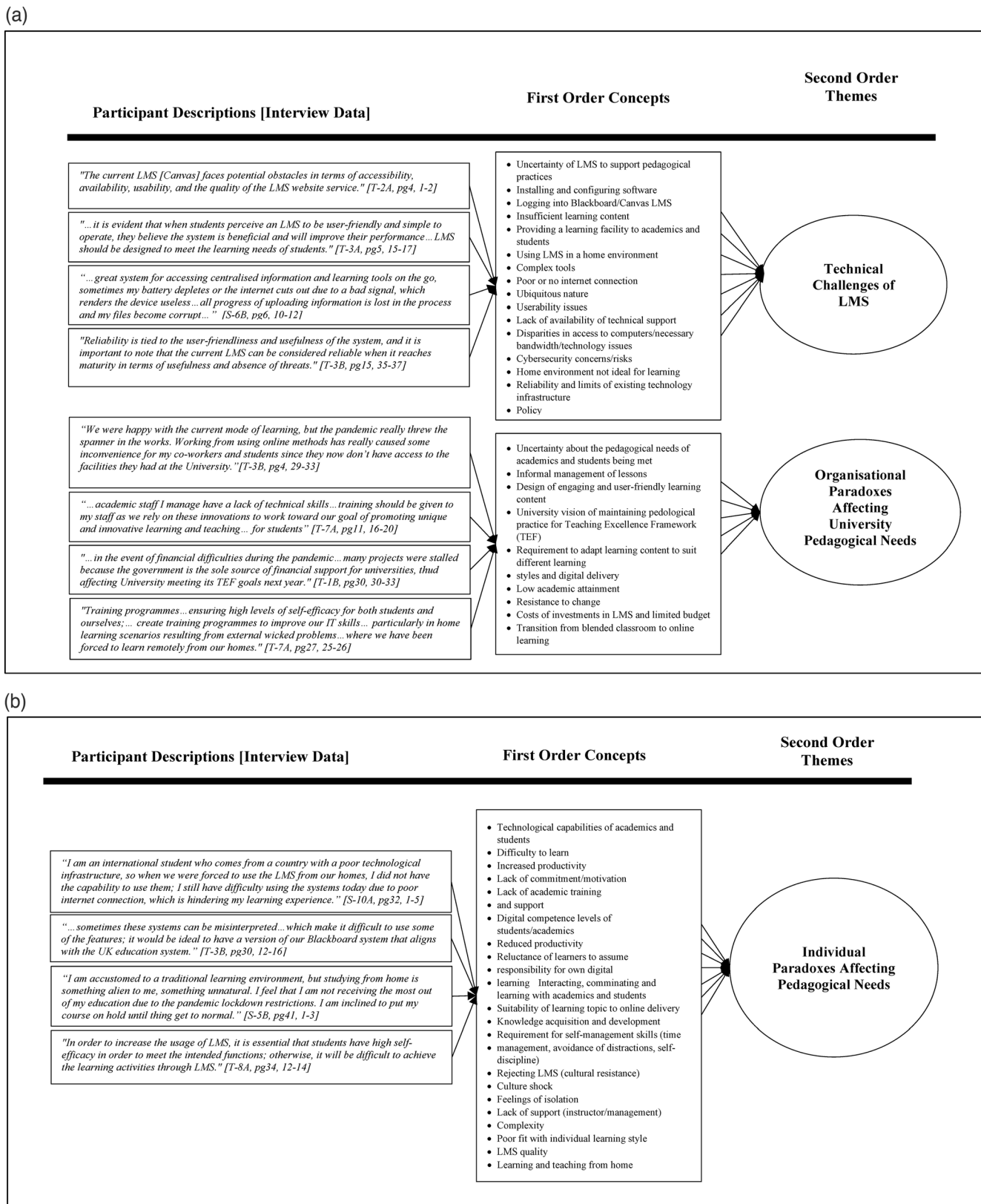


FIGURE 3 Coding and sample data of social actors.

Academics and students collectively pointed out the risks that completely hinder the usability and accessibility of the system. One such risk was depleted battery

power on devices, iPads and tablets [T1-3A, S6-8B] (**technology**). One national student studying on campus stated:

TABLE 4 First order concepts and second order themes.

First order concepts (STS components)						
Second order themes	People	Processes & procedures	Goals	Culture	Technology	Buildings & infrastructure
Technical challenges of LMS usage	Uncertainty of LMS to support pedagogical practices	Installing and configuring software Logging into Blackboard/Canvas LMS Insufficient learning content	Providing a learning facility to academics and students	Using LMS in a home environment	Complex tools Poor or no internet connection Ubiquitous nature User ability issues Lack of availability of technical support Disparities in access to computers/necessary bandwidth/technology issues Cyber security concerns/risks policy	Home environment not ideal for learning Reliability and limits of existing technology infrastructure
Organisational paradoxes affecting pedagogical needs	Uncertainty about the pedagogical needs of academics and students being met	Informal management of lessons Design of engaging and user-friendly learning content	University vision of maintaining pedagogical practice for teaching excellence framework (TEF) Requirement to adapt learning content to suit different learning styles and digital delivery Low academic attainment	Resistance to change	Costs of investments in LMS and limited budget	Transition from blended classroom to online learning
Individual paradoxes affecting pedagogical needs	Technological capabilities of academics and students Difficulty to learn Increased productivity	Interacting, communicating and learning with academics and students Suitability of learning topic to online delivery	Knowledge acquisition and development Requirement for self-management skills (time)	Rejecting LMS (cultural resistance) Culture shock Feelings of isolation	Complexity Poor fit with individual learning style LMS quality	Learning and teaching from home

TABLE 4 (Continued)

Second order themes	First order concepts (STS components)	People	Processes & procedures	Goals	Culture	Technology	Buildings & infrastructure
		Lack of commitment/ motivation Lack of academic training and support Digital competence levels of students/ academics Reduced productivity Reluctance of learners to assume responsibility for own digital learning		management, avoidance of distractions, self- discipline)	Lack of support (instructor/ management)		

“Although this is a great system for accessing centralised information and learning tools on the go, sometimes my battery depletes or the internet cuts out due to a bad signal, which renders the device useless. So, I am unable to access the system ... all progress of uploading information is lost in the process and my files become corrupt ...” [ST6B, pg 6, 10–12].

A course leader also described their experience of using their dedicated LMS and its impact on their staff (**people**):

“As a course leader, I am responsible for designing and managing courses, as well as being responsible for all teaching staff ... the major issue I have is the ongoing complaints from staff in terms of the complexity of the Blackboard system such as accessing online video tools and conferencing tools from home ... most of my academic staff I manage have a lack of technical skills.” [T7A, pg 11, 12–17].

The director of the school has emphasised the needs for the future development of their LMS (**culture**):

“I receive ongoing complaints from students and staff daily regarding the upload of assignments, high resolution poster images and group presentation videos. They complain about the lack of responsiveness and system slowness as they upload content to the system.” [T8A, pg 5, 12–17].

The effectiveness and calibre of the LMS system were also discussed with academics and students as a practical way to get their thoughts on the main issues affecting the use of LMS in their esteemed universities. In addition, the respondents were asked what they thought of the current LMS's user-friendliness, especially for students and academics with limited computer skills. The academics also stated that the design of the current e-learning system is not flexible. The efficiency of the LMS in terms of its usefulness was another topic. The academics and students expressed that the usefulness of the LMS is contingent on the user's perception of its usability. Some academics stated that based on their experience with IT and IS applications, usefulness and user-friendliness cannot be separated. Academics conclude that for the user to be motivated to use the system, he or she must first perceive that it requires no effort. Then he or she will attempt to use it to evaluate its utility (**technology**).

Academics and students also discussed the dependability of the current e-learning system in terms of its efficacy, performance and security. Academics agreed that “*There needs to be a lot of work done to make sure the current LMS system works correctly. If the system's two primary goals—user friendliness and enhanced online learning services for students—are not achieved, we cannot guarantee its effectiveness.*” The academics and students agreed that an LMS can be relied on and trusted if it

meets the needs of the students, and they perceive it to be risk-free (**buildings and infrastructure**): “... because reliability is linked to the system’s usability and usefulness, it is important to note that the current LMS can be regarded as reliable once it reaches maturity in terms of its usefulness and the absence of threats.” [T3B, pg 15, 35–37].

5.2 | Organisational paradox affecting university pedagogical needs

The organisational paradox refers to how LMS impacts paragonical needs at the university level, meaning that while some positives about pedagogical attainment would be revealed, some contradictions or negative outcomes would also arise.

While several lecturers commented about how the canvas and VLE have revolutionised and supported institutional change [T1-4B], paradoxically, some academics and students argued that while the canvas and VLE on campus may support change in some way, pandemic did the opposite and made them resist change as they were currently happy with the existing routine (in this case, moving from blended classrooms to online learning from home) (**buildings & infrastructure**). One lecturer stated:

“We were happy with the current mode of learning, but the pandemic really threw the spanner in the works. Working from using online methods has really caused some inconvenience for my co-workers and students since they now don’t have access to the facilities they had at the University.” [T3B, pg 4, 29–33].

However, one course leader previously mentioned the complaints he had received regarding the complexity of the Canvas system app, leading to reduced productivity. He proposed that his staff be trained to properly use the systems and ultimately use their system training to meet the university’s pedagogical needs (**people**):

“... most of my academic staff I manage have a lack of technical skills ... training should be given to my staff as we rely on these innovations to work toward our goal of promoting unique and innovative learning and teaching styles to provide the best possible learning experience for students” [T7A, pg 11, 16–20].

Although international students stated that the university has a strong commitment towards meeting their pedagogical needs through the variety of resources they provide, such as technologies, facilities and business clusters, paradoxically, the course director and course leaders argued that the university’s lack of commitment towards

investing in technologies may lead to them falling behind, thus endangering students’ future learning needs (**goals**):

“Our university currently have no interest to invest in our students’ learning needs as the higher boards believe that they have more than enough resources to meet these needs, which I completely disagree with. Despite our efforts to secure a budget to update our pedagogical facilities, these efforts have come no avail.” [T1A, pg 1, 2–5].

The lecturers claim that because it involves government regulations and laws, students and ourselves, change management is one of the trickiest problems (**culture and people**). One lecturer stated,

“Change was a huge concern when we went to home lectures because the university faces a great deal of opposition to changing the current situation; therefore, it must be properly managed, taking into account all potential changes from the learning environments to meet the University’s paragonical goals to the emotional impacts on students” [T2B, pg 60, 1–4].

The lecturers then mentioned about the future implementation aspects of change management and stated (**culture**),

“Change management should be broken down into two different strategies: one that deals with university policies and procedures, and the other that manages resistance to change by students and faculty by focusing on cultural factors. If our university wants to adapt while keeping their vision and achieving their long-term institutional goals, they need to take action right away.” [T6A, pg 45, 36–38].

The few resources and a sizable budget deficit suggest that Jordanian universities also struggle with a number of issues, including financial support (**goals**). According to the lecturers,

“... because the government is the only source of funding for universities, many projects were put on hold in the event of financial difficulties during the pandemic, such as the current state of budget deficit, which will have an impact on the university’s ability to meet its TEF goals in the following year.” [T1B, pg 30, 30–33].

Academics also expressed their concerns for training programmes related to LMS usage during a pandemic (**people**),

“Training programmes can be very helpful in ensuring that both students and ourselves have high levels of self-efficacy; therefore, our university should create training programmes to improve our IT skills and become more likely to usage an LMS, particularly in home learning scenarios resulting from external wicked problems

such as the recent pandemic where we have been forced to learn remotely from our homes.” [T7A, pg 27, 25–26].

5.3 | Individual paradox affecting pedagogical needs

The individual paradox refers to academics and students' perceptions of LMS impacting their current and future pedagogical development. Several international students engaging in distance learning highlighted their personal experiences pertaining to their learning outcomes [S10–12A], with the key experience pertaining to culture shock (**culture**):

“I am an international student who comes from a country with a poor technological infrastructure, so when we were forced to use the LMS from our homes, I did not have the capability to use them; I still have difficulty using the systems today due to poor internet connection, which is hindering my learning experience.” [ST10A, pg 32, 1–5].

Another student also reported usability acceptance issues with the University's intelligent systems (**people**):

“I am a distance learner in a country where our technological infrastructure is poor so my internet can randomly disconnect, have many downtime periods and our computers are very slow and dated ... it is even difficult to download and upload content. This creates a huge barrier between the University's LMS and myself, since it is difficult to use under these circumstances; I eventually had to put my course on hold owing to this technological barrier” [ST12A, pg 21, 1–6].

Lecturers reported also on the culture issues impacting their teaching practices (**culture**):

“Our LMS are great facilitators of learning, but sometimes these systems can be misinterpreted as they were developed in another country, which make it difficult to use some of the features; it would be ideal to have a version of our Blackboard system that aligns with the UK education system.” [T3B, pg 30, 12–16].

Similarly, the students emphasised their frustration with the current changes to the learning environment (**technology**):

“I am accustomed to a traditional learning environment, but studying from home is something alien to me, something unnatural. I feel that I am not receiving the most out of my education due to the pandemic lockdown restrictions. I am inclined to put my course on hold until things get back to normal.” [ST5B, pg 41, 1–3].

Some students favour the conventional approaches to education, so opposition to the acceptance of home learning is a problem for the university (**buildings and infrastructure**). The lecturers stated,

“We are still hesitant to use the LMS at home as we are wary of the system's learning services, such as assignment submission, exam administration, etc. Moreover, the issue affects not only students, but also our livelihoods as this transition has limited our teaching capabilities due to the unpredictability of the technology and limited modes of classroom interaction.” [ST3A, pg 32, 4–5].

Self-efficacy was another issue brought up by the academics and students in determining LMS usage for pedagogical development (**people**). Some academics stated,

“To fulfil the LMS's intended functions, students must have high levels of self-efficacy; otherwise, completing the learning activities through the LMS will be difficult.” [T8A, pg 34, 12–14].

6 | DISCUSSION AND CONCLUSION

Our discussion and conclusions drew implications of an STS approach that reflect participatory students' and academics' experiences of using LMS in unprecedented situations. This helped us to answer the following main research question: “*How does a sociotechnical approach help to understand the impact of LMS on pedagogical development through a technical and social lens?*” Based on our STS approach, we developed a model that encapsulates our key findings and contributions (see Figure 3). In the following discussion, we demonstrate how our research question was answered.

6.1 | Technical and social paradoxes of LMS usage in pedagogy

After a thorough and rigorous analysis of the interview data, it was acknowledged that the lack of policy, guidelines and comprehensive procedure documents regarding LMS management and usage constituted a significant technical challenge. The absence of policy documents during COVID-19 in e-learning and continuing education raised concerns because policies serve as a guideline to achieve organisational goals and objectives. Universities struggled with the implementation, management and use of LMSs because there was not a formal policy paper that was accepted and widely disseminated. The literature suggests that successful universities have clear e-learning policies (Almaiah et al., 2020). The main cause of the UK's policy gap is reportedly higher-level university authorities disregarding the formulation and implementation of e-learning policies. The outcome demonstrates that UK universities have not prioritised the adoption of

e-learning and have not planned for a nationwide quarantine in which in-person instruction should be replaced by online learning. This study supports earlier research (Dhawan, 2020).

Lack of a clear policy has resulted in other issues, like an ambiguous and informal governance model. The interviews revealed that the university, students, academics and department heads do not have clear roles and responsibilities when using the LMS service. A thorough explanation of the management and governance structure of the LMS should be included in e-learning policies. The governance model ought to have made clear the obligations of each LMS stakeholder. The policies need to be updated and the necessary changes made before a new service can be used within the organisation. When a new service is introduced, high-level officials in an organisation must manage change. Despite the LMS's implementation and use as a substitute for on-site training for COVID-19, policies and procedures have not been altered to reflect the LMS's use as a new component within the organisation. Putting into action a change management strategy to begin using LMS could be one way to address this problem. All users and stakeholders should have their roles, responsibilities and restrictions, as well as their necessary set of functions, defined in this change management plan.

The quality of LMS was also impacted by a lack of policy and guidelines for system management and usage. The consistency of e-content on the LMS, irregular content updates by lecturers, a lack of resources for developing e-content in universities and a lack of effort in content development have all raised concerns about the quality of the content. According to studies (Taat & Francis, 2020), high-quality content also affects students' willingness to use LMSs. As a result, improving LMS content quality is essential to supporting pedagogical development. The results also lend credence to the idea that the lack of dialogue and interaction between students, the lack of interaction between lecturers and students and the sporadic appearance of lecturers on LMS were major social issues that had an impact on the quality of instruction (Dhawan, 2020). Studies show that lecturers' attitudes towards and involvement in online learning have a positive impact on students' acceptance of or desire to use online learning (Taat & Francis, 2020). Thus, when lecturers use LMS, they can encourage students to enrol in online courses.

Significant technical difficulties included usability, availability and accessibility. Users find LMS challenging to use and struggle to access it with a slow internet connection, which are availability issues. The deployment of the LMS on less advanced infrastructure, having a small management team, a lack of skilled designers and

developers with knowledge in pedagogy, and having low LMS administration skills are all possible causes of these system quality issues noted by academics and students. The literature demonstrates that these technical issues are expected of LMS developers, designers and administrators (De Smet et al., 2016).

Pedagogical management is associated with another social issue, which is the insufficient skills of stakeholders in managing and utilising LMS. The research findings showed that most lecturers and students had limited or no experience in using LMS. In addition to the lack of LMS skills, respondents were also found to have inadequate ICT skills. Previous studies have demonstrated that stakeholder skill level affects the success of an information system (Rosacker & Olson, 2008). Therefore, a comprehensive assessment of the current situation, including user skills, should be the basis for developing and implementing the system. However, the lack of evaluation and research on the skills of UK university stakeholders has impeded the development of LMS and limited its use. Despite the majority of stakeholders being unprepared to use LMS due to a lack of ICT, LMS, and e-content development skills, the university has not provided any training to raise awareness of e-learning or to teach LMS use for all user groups.

This study discovered intriguing social issues within the organisational culture of the UK University. Participants identified a significant sociocultural barrier as university stakeholders' lack of commitment to using LMS. LMS adoption as a substitute for on-site instruction was met with resistance from some lecturers and university administration. Their low commitment may be explained by a lack of understanding of the advantages of LMSs, low LMS and ICT literacy, low perceptions of LMS usefulness and a lack of specific LMS implementation and use policies. Another cultural issue that has impeded LMS's success in UK universities is stakeholders' lack of commitment, which has resulted in resistance to change. The key university cultural issues of low willingness to exchange expertise, department heads' tolerance for lecturers' negligence and a lack of respect for hierarchy were also noted. The cultural issues in universities can be explained by the absence of a comprehensive policy on LMS implementation through expertise exchange, the substitution of subjective norms with objective judgments and a sense of independence from higher-ranking officials among lecturers and mid-level management. Cultural issues related to the organisation were understudied, despite other literature indicating cultural challenges among lecturers regarding LMS or e-learning in terms of instructor's roles and rules within the university (Aldowah et al., 2019). Unexpected results regarding LMS implementation were found when studying

organisational culture, particularly in the United Kingdom. Additionally, technical difficulties were mostly usability barriers in the system that temporarily slowed but did not stop LMS use. The management of university systems was hampered by the lack of a password recovery feature. There was also mention of technical difficulties as a potential roadblock (Taat & Francis, 2020).

In this study, we explored how students used LMS in a social context. Infrastructure, economics, university management, ICT and LMS literacy, performance expectations, content and LMS quality and lecturers' behaviour all have an impact on how well students use LMS. Infrastructure (including internet, electricity and hardware), economics (including the cost of internet and hardware) and ICT skills all had a significant impact on international students from developing nations (knowledge of computers, the internet and LMS). The primary cause of the unplanned timeline for use of the LMS during COVID-19 quarantine across the nation was a lack of thorough planning. This demonstrates the influence of This shows how the behaviour of lecturers, performance standards, content quality (quality of e-content on the LMS), LMS quality (quality of the LMS in terms of usability), university management (management issues within the university) and content quality all affect how well the LMS is used (Alharbi & Drew, 2014; Al-Nuaimi et al., 2022; El-Masri & Tarhini, 2017; Mohammadi et al., 2021). Despite the fact that security, trust and privacy issues did not have as much of an impact on students' use of LMS due to their ignorance of the repercussions of disclosing private information, both academics and students raised concerns about international students' trust issues with LMS and the university's poor trading practices.

Our empirical study looked at the social and technical paradoxes that academic lecturers and students encounter when using an LMS and how those paradoxes affect pedagogical development. The acceptance of lecturers and students was influenced more by their understanding of e-content development than their proficiency with ICT and LMS. Their use of the LMS was hampered by a lack of expertise in e-content development. Resources for developing e-content are lacking, according to lecturers. UK universities were less concerned with e-content development despite plans to implement an LMS. Rooms like video studios with recording and editing technology are needed for content development. Academics defined as LMS quality differently than students, focusing on usability, availability, accessibility and functionality. There is proof that LMS uptime, the accessibility of the platform and the availability of key features are significant determinants of LMS acceptance and use. This study identified the influence of performance expectations

(LMS outcome and usefulness) on stakeholder LMS use. Low LMS knowledge, a lack of LMS experience and low ICT and LMS literacy could all be contributing factors to low pedagogical expectations.

6.2 | New features for LMS

Our findings from the STS approach for analysing LMS through a technical and social lens have led to the recommendation of the following features (see Table 5). This serves as an additional contribution to knowledge.

6.3 | Lessons learned

Our approach of using semi-structured interviews with questions designed to elicit information about the technical and social perspectives of the STS model yielded several lessons learned about general methodological issues in applying the STS model, as well as generalisable issues about LMS applications to pedagogical outcomes. First, conducting interviews with STS-based questions allowed us to elicit critical feedback from both academics and students, allowing us to infer the value these end users placed on various concepts related to technical systems to facilitate pedagogy. Our findings show that by identifying the technical and social challenges of LMS, this method can reveal important themes that can be used to inform and improve future LMS implementation. This qualitative method is limited in that it is resource-intensive and takes a long time to conduct stakeholder interviews and collect qualitative data. More rapid methods of obtaining this type of useful information may be required. Brief surveys tailored to each stakeholder group, for example, could be beneficial but would need to be validated before widespread use. Three key lessons have emerged from the study of the effective use of LMS by various end users in higher education settings. First and foremost, usability and usefulness were recurring themes throughout all interviews. Second, to be useful and safe, any new LMS must be seamlessly integrated with existing technology. Finally, perceived relevance and salience of learning content are critical for successful data collection by academics and students, as well as data use by education providers.

6.4 | Implications for theory and practice

This study explored the impact of LMS usage on pedagogy by identifying the technical challenges and social

TABLE 5 Potential novel features of LMS for universities.

Feature	Description
Automated admin tasks	With the help of these features, administrators can speed up laborious processes like user grouping, group enrolment, deactivation and user population.
Certifications and retraining	LMS should manage ongoing training, continuing education and compliance programmes to enable the tracking and management of all certification and retraining activities.
Course and catalogue management	To deliver more specialised learning, administrators can easily create and manage courses and course catalogues.
Course management	You can enrol large numbers of users, set up advanced course settings, create and assign courses, send notifications, change layouts, upload and manage course materials, and filter courses, channels and learning plans using a computerised LMS.
Gamification	Student engagement will increase if you give them the option to receive recognition for all of their learning activities in the form of points, badges, awards and other prizes.
Globalisation	Learning must take place and be accessible to all students everywhere, so it is essential to have an LMS with extensive language localisations, domain management and global payment gateways for e-commerce.
Integrations	Use an LMS that supports third-party integrations and plugins with other platforms, such as sales force CRM and video conferencing tools, to keep University data synchronised.
Intuitive user interface	A visually appealing learning journey that is simple to follow encourages a seamless change between dashboards and course summaries. The LMS will be easier to use for administrators and students, freeing up their time to learn more about how to improve it.
Micro-learning	Short learner attention spans can be better accommodated by offering readily available, bite-sized educational materials that encourage learning when it is most needed.
Mobile learning	To support learning at the point of need, LMSs should support mobile content access. Because educational resources should be accessible on any device, wherever and whenever they are needed, it is necessary.
Personalised learning paths	It makes the academic journey easier for both students and administrators by grouping a number of courses in the LMS so that students can master a particular subject or programme.
Platform consolidation	Universities can save time, money and effort by combining all use cases into a single LMS.
Reporting	The ability to monitor and evaluate how learning programmes affect the university should be one of an LMS's most crucial features. Through tailored reports and dashboards that display data on learner activity, the LMS should facilitate the development of learning insights.
Social learning	In order to promote idea sharing and the replication of other people's successes, it is essential that LMS support informal training activities. Included should be discussion boards, peer mentoring and knowledge curation.

paradoxes impacting pedagogical development in UK universities. While many studies have explored and developed theory regarding the issues of e-learning in higher education settings, this paper makes an original contribution by identifying that the technical and social perspectives of our STS approach have overlapping relevance for both students and academics who engage in LMS-driven pedagogical development in the following ways: 1) recognising that the technical systems support the development of pedagogical practices more in blended learning environments compared to remote ones, where many wicked and unprecedented challenges emerge from learning remotely during a pandemic; 2) demonstrating that social paradoxes exist in relation to LMS in meeting university and individual (academics and students) pedagogical needs, where many cultural

issues arise such as user resistance. We conclude that technical paradoxes present a barrier to pedagogical development in the transition from blended learning environments to remote ones, where many wicked and unprecedented challenges emerge from learning remotely during a pandemic, while social paradoxes arise from cultural issues such as user resistance that impede the university's pedagogical goals and visions. Consequently, the implications of our paper should interest national and international students and academics, as well as public and private education bodies, as these are key stakeholders in the development of academia and the dissemination of teaching, learning and pedagogical practice. This paper benefited from accessing university stakeholders from a real sample representing students, academics and administrators to provide better guidance for

understanding the nature of LMS usage in developing pedagogy during a wicked and unprecedented situation such as a pandemic.

This paper also contributes to the literature on higher education technologies by introducing future anticipations of the LMS through the lens of our STS approach. We provide additional concepts in the form of system features for LMS pedagogical development: automated admin tasks; platform consolidation; personalised learning paths; intuitive user interfaces; course management; certifications and retraining; course and catalogue management; gamification; integrations; mobile learning; micro-learning; reporting; social learning; globalisation. We encourage universities to incorporate these features to provide a richer and more engaging pedagogical experience while also helping to promote modern features in the LMS, which we found were lacking. From these implications, we identified several limitations and future potential research avenues.

6.5 | Limitations and future work

This paper provided an STS approach to exploring the impact of LMS on pedagogical development through a subjective lens owing to the perceptions garnered from academics and students. An objective view of the research could be incorporated here to provide a positivist empirical lens to improve generalisability of data. Lack of generalisability is also the result of the interpretivist case study approach, which was limited to two UK universities. Surveying a greater number of universities could yield objective data that provides an improved, nuanced and holistic view of the subject matter. Future studies could replicate our research in different countries, particularly in developing countries where technological infrastructure and quality of education are lacking, as our case study was limited to two universities in a developed country (the United Kingdom). Our identification of the new features regarding LMS in higher education settings could also be verified by adopting positivist research to confirm whether these features are indeed demanded by academics and students as our findings suggest.

ORCID

Mohammed Ali  <https://orcid.org/0000-0001-5854-8245>

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APPENDIX A

A.1 | Appendix 1: Case study participant profiles

Participant code	Role	Learning environment	School/department	Year of study/experience	Education level/qualification		
University A (Canvas)							
ST1A	National students	Distance learning	Business school	2	Bachelors (BSc)		
ST2A			Civil engineering	3	Masters (MSc)		
ST3A			Arts/media	1	Bachelors (BSc)		
ST4A	International students	On campus	Business school	3	Masters (MSc)		
ST5A			Computer science	2	Bachelors (BSc)		
ST6A			Business school	1	Foundation year		
ST7A			Political science	2	Bachelors (BSc)		
ST8A			Linguistics	1	Masters (MSc)		
ST9A			Distance learning	Business school	1	Foundation year	
ST10A	Civil engineering	3		Bachelors (BSc)			
ST11A	Business school	3		Masters (MSc)			
ST12A	Computer science	2		Bachelors (BSc)			
T1A	Lecturer	On campus	Business school	4 years teaching business and law		PhD	
T2A			Civil engineering	6 years teaching physics, mathematics and the built environment		PhD	
T3A			Arts/media	3 years teaching film and media		MSc	
T4A			Business school	7 years teaching business, law and information systems		MSc	
T5A			Computer science	5 years teaching ICT, programming and networking		PhD	
T6A			Business school	4 years teaching business, law and information systems		MSc	
T7A			Course leader	Business school	6 years teaching business, law and information systems and 4 years as the business school's course leader		PhD
T8A				School director	Higher faculty	3 years' experience as dean of the school and 6 years of directing the business and law division	

Participant code	Role	Learning environment	School/department	Year of study/experience	Education level/qualification	
University B (Blackboard)						
ST1B	International students	On campus	Business school	3	Foundation year	
ST2B			Political science	1	Bachelors (BSc)	
ST3B	National students	On campus	Linguistics	2	Masters (MSc)	
ST4B			Business school	1	Foundation year	
ST5B			Civil engineering	1	Bachelors (BSc)	
ST6B			Business school	3	Bachelors (BSc)	
ST7B			Computer science	2	Masters (MSc)	
ST8B			Business school	3	Foundation year	
ST9B			Distance learners	Political science	1	Masters (MSc)
ST10B			Linguistics	2	Bachelors (BSc)	
ST11B	Business school	2	Masters (MSc)			
ST12B			civil engineering	1	Foundation year	
ST13B	International students	On campus	Business school	3	Bachelors (BSc)	
ST14B			Political science	3	Masters (MSc)	
ST15B			Linguistics	1	Foundation year	
T1B	Lecturers	On campus	Business school	6 years teaching business, law and information systems	PhD	
T2B			Computer science	5 years teaching ICT, programming and networking	PhD	
T3B			Civil engineering	4 years teaching physics, mathematics and the built environment	PhD	
T4B			Linguistics	3 years teaching English, Spanish, German and French	PhD	
T5B			Director of teaching	6 years' experience as dean of the school and 5 years of directing the business and law division	PhD	