

EVALUATING DISTANCE LEARNING: CULTURAL MEANINGS AND EDUCATIONAL RESILIENCE IN KAZAKHSTAN

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ABSTRACT

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This study aims to evaluate the effectiveness of Kazakhstan's abrupt transition to distance learning during the COVID-19 pandemic, focusing on learner and teacher satisfaction, the performance of e-learning platforms, and socio-cultural factors influencing the experience. A mixed-methods approach was adopted, combining a quantitative survey (n = 140) with qualitative feedback and a comparative review of four major e-learning platforms (Moodle, Blackboard, Edmodo, Schoology). Survey data were analyzed using descriptive statistics and Spearman's rank correlation to examine the relationship between satisfaction and willingness to continue online learning. Qualitative responses and expert commentary contextualized the numerical trends, and platform features were assessed via literature review and technical criteria. Results indicate moderate overall satisfaction with distance learning (approximately 52% of respondents reported satisfaction) and a cautiously optimistic outlook regarding its continuation (approximately 60% were willing to continue fully or partially online, with conditions). A strong positive correlation ($r_s = 0.94, p < 0.05$) was identified between satisfaction and willingness to continue, underscoring that improving online learning quality is key to its future adoption. However, significant challenges emerged: digital inequalities (especially between urban and rural areas) and socio-cultural barriers (limited digital skills, initial skepticism about online education) impeded equitable outcomes. Participants from well-connected, resource-rich settings reported better experiences than those facing poor internet access, and some educators and parents doubted the integrity of online instruction initially. The platform comparison found that open-source, multilingual LMS solutions (Moodle) offer strong alignment with Kazakhstan's needs, whereas costly proprietary systems (Blackboard) may hinder wide implementation despite rich features. In conclusion, Kazakhstan's experience during the pandemic demonstrates that distance learning can be a sustainable component of education moving forward, provided that investments are made in infrastructure, educator training, and culturally responsive strategies to bridge the digital divide.

Keywords: Distance learning; digital inequality; inclusivity; socio-cultural barriers; COVID-19; Kazakhstan; e-learning platforms

1. INTRODUCTION

The COVID-19 pandemic in 2020 forced an unprecedented global shift from traditional classroom instruction to distance learning (Alismaiel et al., 2022; Mathrani et al., 2023; Miao et al., 2022; Oyedotun, 2020). In Kazakhstan alone, nationwide school and university closures affected approximately 3 million school students and nearly 500,000 university students (Nurgaliyeva et al., 2024). This abrupt transition tested the country's technological infrastructure and its socio-cultural readiness for digital education. Distance learning is broadly defined as instruction in which learners and instructors are separated by space and/or time, with communication mediated through technology. This modality was suddenly implemented on a massive scale (Costa et al., 2021; Turnbull et al., 2021). Early observations revealed that Kazakhstan was largely unprepared: many officials and educators admitted the nation was “not ready” for full online instruction, citing inadequate infrastructure, lack of digital content, and untrained staff (Bokayev et al., 2021; Burakanova et al., 2021; Seilkhan et al., 2022). Connectivity emerged as a critical issue, especially in rural areas, where limited internet access and device shortages exacerbated pre-existing educational inequalities (Mathrani et al., 2023). Moreover, there was skepticism among parents and communities about the quality of emergency online instruction; some viewed the hastily arranged virtual classes as “more of a profanation than true learning”, questioning whether meaningful education was taking place. These reactions underscored that the challenge was not only technical but also deeply cultural and social, touching on entrenched norms and expectations about schooling in Kazakhstan (Yelubayeva et al., 2023).

From a theoretical perspective, this study approaches distance learning as an object of educational evaluation rather than solely as a technological solution. The evaluation framework is grounded in satisfaction-based evaluation approaches and technology acceptance research, where learners' and teachers' perceptions of quality and usefulness serve as key indicators of effectiveness, particularly in emergency remote teaching contexts where traditional outcome measures are constrained. In addition, the study draws on digital divide theory and socio-cultural perspectives to conceptualize inequality and inclusion in access and participation, framing distance learning as a culturally embedded educational practice shaped by unequal resources, institutional trust, and prevailing norms and attitudes (Davis, 1989; van Dijk, 2005). By integrating these perspectives, the research situates Kazakhstan's experience within a broader global context of digital inequality and educational disruption, offering insights applicable to other education systems facing similar challenges (Chatelier & Voicu, 2018; Miao et al., 2022).

Against this backdrop, the present study evaluates Kazakhstan's distance learning experience from both pedagogical and socio-cultural perspectives. Effectiveness is examined through users' satisfaction with emergency remote learning and its relationship to their willingness to continue using online or blended formats. The study also investigates how digital inequality and inclusivity issues shaped learning experiences during the transition, identifies socio-cultural barriers affecting the acceptance of distance education, and compares distance learning modalities, including widely used e-learning platforms, in terms of their effectiveness and contextual suitability for Kazakhstan.

This study contributes to the literature in several ways. Empirically, it provides mixed-methods evidence on distance learning in Kazakhstan, a national context that remains underrepresented in international research. Analytically, it demonstrates the relationship between user satisfaction and willingness to continue online learning. Theoretically, it integrates pedagogical evaluation with digital divide and socio-cultural perspectives, conceptualizing distance learning as a culturally embedded educational practice. Practically, the findings offer policy-relevant insights for developing more inclusive and resilient digital education strategies beyond the pandemic.

2. MATERIALS AND METHODS

2.1 Research design

This study employed an explanatory mixed-methods design, in which quantitative survey data were collected and analyzed first, followed by qualitative data used to contextualize and explain the statistical findings (Creswell & Clark, 2017). The survey provided numeric indicators of satisfaction with distance learning and willingness to continue its use, while open-ended responses and follow-up interviews were used to clarify the socio-cultural and infrastructural factors shaping these outcomes in the Kazakhstani context.

In addition, this study incorporates a narrative qualitative approach to better understand participants' lived experiences of distance learning in Kazakhstan. The narrative approach allows for the exploration of how individuals construct and interpret their experiences within specific socio-cultural contexts, particularly in relation to digital inequality and access to education.

2.2 Data collection and participants

Quantitative data were collected through an online survey administered in 2021 using a convenience sampling approach involving 140 participants (male = 68, female = 72). The sample included 18 secondary school teachers, 62 secondary school students, and 60 university students, allowing comparison across different educational roles and levels.

In addition to gender and educational role, several contextual characteristics were considered. Participants represented both urban ($n = 78$) and rural areas ($n = 62$), reflecting differences in access to digital infrastructure. Respondents also reported varying levels of prior experience with distance learning modalities, including learning management systems, live online classes, and asynchronous digital materials. These characteristics were used to contextualize survey responses and to examine how educational role, location, and learning conditions shaped perceptions of distance learning.

This study followed an explanatory mixed-methods logic: the quantitative survey served as the primary strand to identify overall patterns of satisfaction and willingness to continue distance learning, while qualitative evidence (open-ended survey responses and follow-up interviews) was used to contextualize and explain these patterns rather than to make independent statistical claims. To reduce researcher subjectivity, qualitative interpretation was constrained by explicit linkage to participants' statements and triangulated against quantitative trends and available external sources.

2.3 Qualitative sampling and data collection

The qualitative component of the study was based on a purposive sampling strategy. Follow-up semi-structured interviews were conducted with a subset of survey respondents who had indicated willingness to provide additional comments on their distance learning experience. In total, 14 interviews were conducted, including 10 students (from both secondary and higher education) and 4 educators. Participants were selected to reflect variation in educational role, geographic location (urban and rural), and overall satisfaction with distance learning.

In addition, three expert informants were included to provide contextual perspectives on distance learning implementation during the pandemic. These experts represented educational administration and local education research and were selected based on their professional involvement in distance education policy or practice in Kazakhstan. Interviews focused on perceived challenges, adaptation strategies, and sustainability of distance learning rather than on individual performance. All interviews were conducted remotely, recorded with participants' consent, and analyzed thematically alongside open-ended survey responses.

Within this framework, participants' responses were treated as individual narratives reflecting their personal educational journeys during the transition to online learning. These narratives were analyzed not only for content but also for underlying meanings, emotions, and contextual factors influencing their experiences.

2.4 Instrument

The survey instrument gathered information on participants' experiences during the 2020 remote learning period. It included Likert-scale questions measuring overall satisfaction with distance learning and willingness to continue with online or blended learning in the future. Additional items probed specific challenges faced (connectivity issues, workload, engagement) and the use of various distance learning modalities (platform-based learning, live video classes, pre-recorded lessons, television broadcasts, paper materials). To analyze the survey data, descriptive statistics were computed to summarize key indicators.

Crucially, the strength and direction of the association between two ranked variables—satisfaction with distance learning and willingness to continue—were analyzed using Spearman's rank correlation coefficient. This non-parametric test was chosen for its robustness in handling ordinal data and small sample sizes, which are common in educational research settings (Sedgwick, 2014). Spearman's rank correlation coefficient (r_s) is calculated using the following formula:

$$r_s = 1 - \frac{6 \sum_{i=1}^n d^2}{(n^3 - n)}$$

Where r_s is Spearman's rank correlation coefficient, d represents the difference between paired ranks, and n denotes the number of paired observations. The correlation's significance was evaluated (with a significance threshold of $p < 0.05$) to determine whether the observed relationship was unlikely to be due to chance. Additionally, the Chaddock scale (Chaddock, 1925) was used to assess the strength of the correlation (Table 1).

Table 1: The Chaddock scale

Absolute value of r_{xy}	Strength of the correlation
Less than 0.3	Weak
0.3 to 0.5	Moderate
0.5 to 0.7	Noticeable
0.7 to 0.9	High
Over 0.9	Very high

In parallel, qualitative data were gathered through open-ended questions in the survey and follow-up semi-structured interviews with a subset of respondents and experts. Participants were invited to comment on what they found most challenging or beneficial about distance learning, in their own words. These narrative responses were analyzed thematically, allowing the researchers to identify common themes such as connectivity problems, engagement strategies, emotional well-being, and perceptions of instruction quality.

In addition, a narrative-informed thematic analysis was applied to capture recurring storylines and patterns across participants' accounts while preserving the integrity of individual experiences. Particular attention was given to how participants described barriers, adaptation strategies, and perceptions of digital learning environments within their socio-cultural context.

Expert commentary, including public statements by education officials and insights from local educational researchers, was also incorporated to enrich the qualitative context (Durrani et al., 2023; Graham, 2018; Kirillova, 2000). To ensure validity, data triangulation was used: for example, recurring issues mentioned by respondents (like internet connectivity) were cross-checked against external reports on Kazakhstan's digital infrastructure during the pandemic.

Additionally, the study featured a comparative evaluation of e-learning platforms relevant to Kazakhstan's context (Alqahtani, 2019; Ferdianto & Dwiniasih, 2019; Gamage et al., 2022; Kinash et al., 2012; Martin, 2008; Terras & Ramsay, 2015). Four widely used global learning management system (LMS) platforms were selected for analysis: Moodle, Blackboard, Edmodo and Schoology. These platforms were chosen because they represent a range of commonly adopted solutions during the pandemic, each with different features and levels of complexity. The evaluation did not involve new primary data from platform users; instead, it was based on literature review and technical assessments. Sources included platform documentation, user reviews, and previous studies of these LMSs (Lalima & Dangwal, 2017; Moorhouse & Yan, 2023). Each platform was examined against a set of criteria important for the Kazakhstani educational environment. The criteria included: features and tools for teaching; accessibility and technical requirements; language support; customization and integration capacity; analytics capabilities; and scalability and cost considerations. Each platform was qualitatively rated on these dimensions. This platform analysis was intended to identify which systems might best align with Kazakhstan's needs and constraints, rather than to declare an overall "best" platform. In essence, the methodology integrated survey-based metrics, personal experiences, and technology assessment to build a comprehensive picture of Kazakhstan's distance learning experience. This combined approach allows the study to connect measurable outcomes (satisfaction levels, usage patterns) with underlying causes (digital divide, pedagogical adaptability, platform suitability), thereby strengthening the basis for conclusions and recommendations. This narrative perspective complements the quantitative findings by providing deeper insight into the human dimension of digital inequality, allowing for a more holistic interpretation of distance learning experiences in urban and rural contexts.

3. SURVEY FINDINGS, CORRELATION ANALYSIS, AND PLATFORM COMPARISON

The survey revealed a moderate level of overall satisfaction with the distance learning experience during the pandemic. On a five-point scale from "very dissatisfied" to "very satisfied," just over half of respondents (approximately 52%) indicated that they were either satisfied or very satisfied with their online learning experience. About 30% reported a neutral stance, and roughly 18% were dissatisfied to some degree with distance education. These numbers suggest that despite numerous challenges, the majority were content that educational activities could continue remotely. Notably, many university students fell into the satisfied group, often citing advantages such as not needing to commute and having more flexibility in managing their study schedules. In contrast, those who were dissatisfied frequently pointed to the lack of in-person interaction, difficulties in maintaining motivation, and technical problems as primary reasons. Teachers on average reported slightly higher satisfaction than students; some educators appreciated the autonomy to organize their teaching schedule and the opportunity to develop new IT skills as professionals, whereas some students deeply missed the social atmosphere of campus and direct teacher guidance.

When asked about the future, majority of participants showed openness to continuing with distance or blended learning in some form. About 60% responded with “Yes” or “Maybe (under certain conditions)” to whether they would like to keep using online learning post-pandemic. Specifically, 35% were decidedly in favor (willing to continue fully or partially online), and an additional approximately 25% were tentative, saying they might be willing if certain improvements (better internet reliability, more engaging methods, etc.) are in place. Meanwhile, 40% preferred “No, a full return to in-person learning,” reflecting a substantial segment that still favors traditional classrooms. This division in willingness marks a significant shift in mindset compared to the pre-COVID era, when online education was relatively uncommon in Kazakhstan. The fact that a clear majority is at least somewhat open to online learning indicates that the forced experiment altered perceptions: many now recognize distance learning as a viable mode if executed well. At the same time, the conditions attached to the “maybe” responses emphasize that stakeholders’ willingness is contingent on quality—issues such as technical stability, quality of digital content, and effective engagement need to be addressed to maintain long-term acceptance.

Crucially, the analysis found a strong positive correlation between participants’ satisfaction with their distance learning experience and their willingness to continue using such modes in the future (Table 2). Spearman’s rank correlation between the satisfaction level and willingness (intention to continue online learning) was approximately $r_s = 0.94$ (very high correlation), which was statistically significant ($p < 0.05$).

Table 2: Satisfaction with different distance learning modalities and willingness to continue their use

Method of study	Satisfaction with the result (x)	Willingness to continue learning (y)	Rank X	Rank Y	$(d_x - d_y)^2$
Educational platforms	138	130	6	6	0
Live broadcast mode	125	118	5	5	0
Video materials	95	60	4	4	0
Television	45	12	3	2	1
Printed materials	35	45	2	3	1
Radio	5	2	1	1	0
			$\Sigma 21$	$\Sigma 21$	$\Sigma 2$

Based on the Chaddock scale (Table 1), the analysis indicates a strong and direct correlation between satisfaction with and readiness for distance learning. Those with better experiences were far more likely to embrace online learning going forward, whereas poor experiences discouraged continuation. This result aligns with observations elsewhere, showing that acceptance of online classes often depends on user experiences (Baran & AlZoubi, 2020; Nurgaliyeva et al., 2024). For policymakers in Kazakhstan, enhancing satisfaction through better support, training, and resources is crucial for the sustainable adoption of distance learning.

3.1 Effectiveness of different learning modalities

Learning management systems (LMS) clearly emerged as the most effective distance learning modality in this study. Compared with all other formats examined, LMS learners reported the highest satisfaction levels and strongest willingness to continue distance learning beyond the pandemic period (Table 2). This finding reflects not only technological preference but also the ability of LMS platforms to support stable, structured, and pedagogically coherent learning under disruptive conditions. Quantitatively, LMS-based learning achieved the highest satisfaction score ($x = 138$) and willingness-to-continue score ($y = 130$), ranking first on both indicators. Qualitative evidence helps explain this dominance. In open-ended survey responses and follow-up interviews, participants repeatedly emphasized that LMS platforms provided a centralized and predictable learning environment, where course materials, assignments, deadlines, and feedback were integrated within a single system. Several students noted that having “*everything in one place*” reduced confusion and helped them organize their studies during periods of uncertainty. Teachers similarly reported that LMS platforms allowed them to maintain instructional continuity by streamlining assessment, grading, and communication processes despite physical separation. Students frequently highlighted the value of asynchronous access, explaining that the ability to revisit recorded lectures and archived materials made it easier to keep up with coursework, particularly in households with shared devices or unstable internet connections. As one student explained, asynchronous access allowed learning to continue “*even when live classes were missed due to technical problems*.” Teachers also pointed out that LMS tools supported clearer expectations and accountability, reinforcing a sense of academic normality. Beyond usability, participants perceived LMS-based learning as more academically legitimate than other distance learning modalities, associating it with established educational routines and standards. This perception strengthened trust in online instruction and contributed to a higher willingness to continue using LMS-based learning after the emergency phase.

Live online classes (e.g. Zoom, Google Meet, etc.) ranked second in perceived effectiveness, with relatively high satisfaction ($x = 125$) and willingness to continue ($y = 118$). Synchronous instruction was valued for enabling real-time interaction, immediate feedback, and maintaining a sense of classroom continuity. However, compared to LMS-based learning, its effectiveness was more vulnerable to connectivity disruptions and rigid scheduling requirements, which limited sustainability for some learners, particularly in rural or low-bandwidth contexts.

By contrast, low-tech modalities, including video materials, television lessons, printed materials, and radio, were consistently evaluated as the least effective. Although these formats played an important compensatory role during emergency school closures—especially where digital infrastructure was limited—their lack of interactivity, feedback mechanisms, and personalization significantly reduced their educational value. As reflected in Table 2, these modalities were associated with substantially lower satisfaction levels and weaker readiness to continue.

Overall, the findings establish a clear hierarchy of effectiveness: LMS-based learning ranked first, live online instruction second, and low-tech solutions functioned primarily as temporary stopgap measures. The preference for LMS platforms suggests that the sustainability of distance learning depends not simply on access to digital tools, but on the presence of structured, flexible systems that support autonomy, accountability, and pedagogical continuity.

3.2 Digital inequality: Urban-rural disparities

The study's findings highlight digital inequality as a critical factor influencing the distance learning experience in Kazakhstan. There was a noticeable gap in satisfaction and outcomes between urban and rural respondents, underscoring the urban-rural digital divide. On average, participants from rural areas reported significantly lower satisfaction with online learning and were less willing to continue with it than their urban counterparts. For example, only about 40% of rural students in the survey expressed satisfaction with their distance education experience, compared to 57% of urban students. Rural respondents were also roughly twice as likely to say “no” to continuing with any form of online learning in the future. The primary reason for this disparity is unequal access to reliable internet and technology. Nearly all rural participants recounted some form of connectivity problem: either weak and intermittent internet signals, lack of affordable data, or having to share a single device among multiple family members. By contrast, most urban participants had broadband or stable mobile internet and more readily available devices (computers or tablets).

Qualitative responses further illustrate how these infrastructural constraints directly shaped students' learning preferences and their ability to sustain engagement in distance learning. Rural students frequently described unstable internet access as a source of frustration and disengagement. One respondent noted that *“the connection would drop several times during a lesson, so it was impossible to follow the lecture properly.”* Another student explained that *“when several family members had online classes at the same time, we had to take turns using one phone, which meant missing lessons.”* These accounts indicate that limited connectivity not only reduced satisfaction but also undermined students' capacity to participate consistently in online learning activities. These results are corroborated by a recent national study (Nurgaliyeva et al., 2024), which found that rural students in Kazakhstan faced greater challenges and lower satisfaction during COVID-19 online learning than urban students. Importantly, qualitative evidence suggests that students' rejection of distance learning in rural areas was driven less by negative attitudes toward technology itself and more by structural barriers that made sustained participation difficult or impossible. In essence, students and teachers outside the major cities often could not fully participate in digital learning due to infrastructure gaps, leading to a markedly inferior educational experience.

Taken together, the findings demonstrate that digital inequality operates not only as a technological issue but also as a determinant of students' preferences and resilience in distance learning. When basic conditions for access are unmet, distance education is perceived as exhausting rather than empowering, reinforcing resistance to its continued use. This finding reinforces the urgency of addressing connectivity and equipment shortages as a policy priority; otherwise, the benefits of digital education will be unequally distributed, widening existing educational disparities between regions.

3.3 Inclusivity and gender considerations

Gender dynamics in the sample showed some nuanced effects on the distance learning experience. Overall, male and female students reported similar levels of satisfaction on average, suggesting that both benefited and struggled in comparable ways. However, qualitative feedback indicated that many female students, especially in secondary school, had a heightened need for interpersonal interaction and support. They were slightly more likely to mention missing face-to-face contact with teachers or classmates as a drawback of online learning.

Qualitative responses illustrate how this need for interaction influenced students' learning experiences. Several female respondents described the absence of direct communication as emotionally challenging and demotivating. One student noted that *"without seeing the teacher in person, it was harder to stay engaged and ask questions"* (Informant no.4, rural female secondary school student, online survey, November 10, 2021). Another participant emphasized that *"online lessons felt isolating, especially when there was little feedback"* (Informant no.13, urban female secondary school student, online survey, November 22, 2021).

Additionally, several female respondents noted that during the pandemic they had to take on extra household responsibilities (such as helping with chores or caring for younger siblings while parents worked), which sometimes conflicted with their study time. Such socio-cultural factors could have made sustained focus on online classes more difficult for some girls, though Kazakhstan did not experience a dramatic gender gap in participation. This pattern is further supported by qualitative accounts in which female students explicitly linked household duties to learning fatigue. One respondent explained that *"studying from home meant combining lessons with family responsibilities, which reduced concentration during online classes"* (Informant no.35, urban female university student, online survey, November 13, 2021). These accounts suggest that challenges to sustained engagement were shaped not only by educational design but also by domestic expectations.

The findings resonate with international concerns that remote learning in certain contexts can disproportionately impact girls, especially where cultural norms assign them more domestic duties or restrict technology use (Gherheş et al., 2021). Among participants in this study, female students were marginally less inclined than males to want to continue with fully online learning, possibly reflecting these additional burdens and the greater value they placed on in-person engagement. Importantly, qualitative evidence suggests that this lower preference for continued online learning was driven less by negative attitudes toward technology itself and more by social and emotional constraints affecting sustained participation. Nonetheless, both genders shared many core challenges, and the gender differences observed were not as pronounced as urban-rural differences.

3.4 Teachers' vs. students' perspectives

The survey captured perspectives from both students and educators, revealing some contrasts between these groups. Teachers, in general, approached the distance learning period with a dual viewpoint: their own professional adaptation and their concern for student learning. A majority of teachers (around 65%) felt that student learning outcomes suffered during online instruction compared to pre-pandemic, citing issues like reduced curriculum coverage, difficulties in student attention, and the limitations of assessing understanding through a screen. Many noticed that some students simply disengaged or performed the bare minimum, which was worrisome in terms of educational quality.

Qualitative responses from teachers provide concrete evidence for these concerns. Several educators described difficulties in maintaining students' attention and monitoring comprehension in online settings. One teacher noted that *"it was hard to understand whether students were really following the lesson or just logged in and absent"* (Informant no.7, rural male secondary school teacher, interview, November 15, 2021). Another explained that *"assessment online often showed participation, but not real understanding"* (Informant no.11, rural female secondary school teacher, interview, November 16, 2021). These accounts illustrate how perceived declines in learning outcomes were linked to limited feedback and reduced classroom interaction. Despite recognizing these shortcomings, more than half of the teachers (approximately 55%) reported being personally satisfied with how they managed the transition, given the circumstances. This suggests that teachers took pride in their own rapid upskilling and improvisation to keep classes running. Indeed, teachers often had to master new tools (like Zoom or learning platforms) almost overnight, and doing so successfully was a source of professional accomplishment. Teachers frequently emphasized this adaptive effort in qualitative comments. Several respondents described the transition as *"stressful but professionally valuable,"* noting that learning to use digital platforms expanded their pedagogical repertoire. One educator remarked that *"although online teaching was not ideal, it forced us to learn skills that will be useful in the future"* (Informant no.3, urban female secondary school teacher, interview, November 10, 2021). When considering the future, teachers were more cautious: a large portion selected "maybe, with improvements" regarding continuing online teaching, and they frequently emphasized that a blended model (combining online with traditional in-person classes) would be preferable to 100% online. Many teachers see value in the flexibility of online elements but do not want to lose the face-to-face classroom context entirely. Qualitative evidence suggests that this cautious stance reflects a concern for sustainability rather than outright rejection. Teachers often stated that *"online tools work best as a supplement, not a replacement,"* highlighting the importance of in-person interaction for maintaining learning quality.

Students, on the other hand, were primarily concerned with their own learning experience and daily life adjustments. Students who favored online learning tended to highlight concrete benefits: flexible scheduling, ability to learn at one's own pace, extra sleep, and being in a comfortable home environment. Some university students noted they could review recorded lectures multiple times, which helped in understanding difficult material. These conveniences led a subset of students to feel that online learning, when done well, could be more efficient or at least equally effective for them personally.

Qualitative responses reinforce these preferences. Several students explicitly mentioned that recorded lectures *"made it easier to revisit difficult topics"* and that flexible schedules *"reduced daily stress."* These comments indicate that acceptance of distance learning was closely tied to perceived improvements in personal time management and autonomy. Conversely, students who disliked the online shift mainly missed the social dimension: casual interactions with peers, direct mentorship from teachers, and the motivating atmosphere of the classroom. They also mentioned finding it harder to concentrate amid home distractions and lacking immediate help when confused by coursework. Students frequently described these issues in personal terms. One respondent stated that *"studying alone at home made it easy to lose motivation,"* while another explained that *"without quick feedback from teachers, small problems became big ones"* (Informant no.36, urban female university student, online survey, November 25, 2021). Such statements illustrate how reduced interaction directly affected students' ability to sustain engagement. Unlike teachers, students' willingness to continue with online learning correlated strongly with whether they had a positive experience; there was no inherent objection to online education so much as a practical one. Overall, this divergence in perspective suggests that teachers evaluate distance learning partly on educational outcomes (and many saw negatives there), while students evaluate it on usability and lifestyle impact.

To sum up, the qualitative findings indicate that teachers' reservations stem largely from concerns about learning quality and assessment, whereas students' preferences are shaped by the balance between flexibility and social support. Both views are important: effective policy should strive to ensure that learning outcomes do not decline (addressing teachers' concerns), while also enhancing the student experience and convenience (addressing students' hopes for flexibility).

3.5 Qualitative insights: Infrastructure and socio-cultural challenges

The open-ended responses and interviews provided rich narratives that help explain the quantitative patterns above. A dominant theme was the struggle with infrastructure. Especially in rural or economically disadvantaged settings, participants described significant efforts to access online classes. One student from a village recounted climbing onto the roof of their house or walking to a hilltop in order to obtain a stable mobile signal for attending classes. As one rural student put it, *"I had to climb onto the roof every morning just to hear the teacher"* (Informant no.41, rural male secondary school student, interview, December 7, 2021). Others mentioned having to repeatedly reconnect due to dropped internet, missing significant portions of lessons as a result. A teacher from a small town noted that because many of her students had no home Wi-Fi, she resorted to sending audio lessons and assignments via WhatsApp—a very one-sided form of instruction with minimal interaction. These stories illustrate the digital divide within Kazakhstan: while an urban student in Almaty could stream high-quality lectures with few issues, a rural student in Turkestan struggled simply to stay online. Such disparities made many rural participants feel left behind. A parent interviewed by phone lamented that without reliable internet, *"what can you do?"*—their child's learning essentially stalled despite the school's efforts, leading to worries about learning loss. These qualitative accounts indicate that students' rejection of distance learning in rural areas was driven less by resistance to technology itself and more by structural barriers that undermined their ability to sustain participation over time. These accounts underscore that ensuring basic connectivity and access to devices is foundational for any successful distance learning—a lesson reinforced by global data showing hundreds of millions of students lacked internet during the pandemic (UNICEF & The International Telecommunication Union, 2020).

Another significant theme was the learning curve in digital competence. Many teachers, particularly older ones, described the early weeks of the transition as extremely challenging. One veteran teacher in her 50s admitted feeling a sense of "digital shock"—she had never used video conferencing or her university's LMS extensively before and suddenly had to do all her teaching online. She and others sought help from younger colleagues or even their own children at home to learn how to upload materials, manage virtual classrooms, mute/unmute participants, etc. On the student side, although young people are often assumed to be tech-savvy, not all had experience using productivity or educational software. Some students struggled with typing out long assignments or navigating multiple platforms for different classes. Qualitative evidence suggests that limited digital competence initially constrained both teachers' instructional effectiveness and students' confidence in online learning, affecting their willingness to view distance education as a viable long-term option. Both groups gradually improved their digital skills out of necessity, but the experience exposed a preparedness gap. It was evident that neither teacher training programs nor school curricula had sufficiently

incorporated digital literacy for academic contexts prior to COVID-19. This finding points to a need for systemic investment in digital skills training for educators and students alike, to better prepare for any future remote learning and to generally integrate technology into teaching.

Socio-cultural attitudes also played a pivotal role. In the initial phase of distance learning, there was widespread skepticism about the quality and fairness of online education. Educators and parents expressed doubts that real learning was occurring through a screen. Concerns about academic integrity were common—with exams and assignments happening remotely, many feared increased cheating or that students were not doing their own work. A local policy think-tank (PaperLab) analyzed the situation and argued that knowledge assessment became superficial during the online semester, with inflated grades that didn't necessarily reflect real understanding (Beisenbaev et al., 2020). Such perceptions influenced students' motivation and engagement, as several respondents suggested that when online learning was viewed as "not serious," sustaining effort became more difficult. As one student admitted, *"When everyone treated online classes like they didn't really count, it was hard to make myself study seriously"* (Informant no.19, urban male university student, online survey, November 26, 2021). Such perceptions, if pervasive, can undermine the credibility of distance education. Indeed, if students believe standards are lax, they may not take online classes seriously; if teachers believe the medium is inherently ineffective, their motivation to innovate might drop. In Kazakhstan, some teachers noted that without face-to-face supervision, they had trouble gauging student engagement and honesty. Over time, the Ministry of Education had to actively address these concerns—for instance, by adjusting grading policies and communicating efforts to uphold academic standards, as well as sharing success stories of schools that managed distance learning well to boost public confidence.

Over the several months of implementation, attitudes gradually evolved. As both teachers and students became more comfortable with the tools and routines of online learning, outright resistance diminished. By the end of 2020, many who were initially very critical had moderated their views, acknowledging that while not perfect, online education was workable and had some advantages. This "forced trial" seemed to have somewhat normalized the idea of learning outside a physical classroom. Notably, familiarity bred acceptance to an extent—a pattern consistent with the theory of technological adoption in education, which suggests exposure and experience can alleviate cultural barriers. This gradual shift suggests that familiarity and experience increased acceptance of distance learning, even among initially skeptical participants, supporting theories of educational technology adoption based on exposure and adaptation. However, the social aspect of education remained a commonly cited missing piece. Students and teachers alike commented on the emotional strain of isolation and the challenge of sustaining motivation in a purely virtual environment. Some students mentioned mental health stresses or increased loneliness, which in turn affected their academic performance. One university student reflected, *"Sitting alone in front of a screen for months, I started to feel invisible—like no one would notice whether I logged in or not"* (Informant no.26, urban female university student, online survey, November 28, 2021).

Alongside the challenges, the crisis also uncovered some unexpected benefits and opportunities. A number of respondents discovered new self-regulated learning habits—for example, students learned to manage their time better or explore supplementary learning resources online on their own. Teachers found themselves collaborating more with colleagues (sharing tips on using Zoom, creating digital content, etc.), which fostered a sense of professional community. Additionally, the experience has spurred broader discussions in Kazakhstan about modernizing education and integrating technology thoughtfully into teaching.

These qualitative insights indicate that students who developed self-regulation skills and received most of the surveyed participants are open to some forms of distance or blended learning going forward suggests a cultural shift: online tools will likely continue to be used in ordinary times (for homework portals, supplemental courses, snow days, etc.), thereby gradually building a more resilient education system. These qualitative insights reinforce the idea that the effectiveness of distance learning is a socio-technical matter—success depends not just on internet bandwidth or software, but also on human adaptation, support systems, and attitudes.

3.6 Comparative evaluation of e-learning platforms

As part of understanding the technological component of Kazakhstan's distance learning experience, this study reviewed four major e-learning platforms with an eye to their suitability in the local context. The platforms Moodle, Blackboard, Edmodo, and Schoology each have distinct characteristics, and the analysis identified strengths and potential limitations of each in relation to Kazakhstan's needs:

Moodle is an open-source LMS known worldwide for its flexibility and extensive community support. The evaluation highlighted Moodle's multilingual support as a key advantage; it supports over 50 languages, including options for Kazakh and Russian interfaces. This is crucial in a bilingual educational system, ensuring both students and teachers can navigate the platform comfortably. Moodle's open-source nature also allows high customization—it can be tailored to local curricula and integrated with various plugins (for example, for video conferencing or plagiarism detection), and it can be hosted locally to comply with data requirements.

Additionally, Moodle is cost-effective (free software, requiring only server infrastructure and maintenance), which makes it attractive for broad deployment in a national education system. These factors suggest Moodle could be a strong candidate for Kazakhstan if a unified platform approach were considered. The trade-off is that Moodle requires technical support and training to implement effectively; without proper IT backing, its rich features might overwhelm some users.

Blackboard Learn is a proprietary, enterprise-grade LMS widely used in higher education globally. It offers a comprehensive suite of features—robust course management tools, built-in web-conferencing (Blackboard Collaborate), assessment and grading systems, and detailed analytics on student performance. Blackboard's strengths include these powerful features and an interface that, while complex, is designed to handle large university environments. For Kazakhstan, Blackboard's drawbacks would be its cost and accessibility: it requires purchasing licenses and possibly dedicated support contracts, which could be a barrier for many public institutions. Moreover, Blackboard supports fewer languages (around 20) than Moodle, and while it does support Russian, support for Kazakh is limited or would need to be developed. This means some localization effort might be required. Blackboard's heavy feature set also assumes reliable high-speed internet and up-to-date user devices, which might not hold true in all Kazakhstani contexts. In short, Blackboard could serve well in top universities or elite schools that have resources, but it may not be feasible as a nationwide solution without significant investment. Its value in the comparison is illustrating the upper range of LMS capabilities—features that Kazakhstan might aspire to incorporate (like integrated virtual classrooms and analytics) even if via other means.

Edmodo is a cloud-based platform that blends social networking features with classroom tools. It gained popularity in school settings (K-12) due to its simplicity and approachable design for teachers and younger students. The assessment found that Edmodo's key advantage is its user-friendliness and quick adoption. Teachers can create groups and start sharing materials or quizzes with minimal setup, and students join with a class code. This low barrier to entry proved useful when schools had to rapidly adapt during the early stages of the pandemic. Edmodo also has no direct financial cost, which made it a popular stopgap solution in many places. However, Edmodo is less feature-rich than full LMSs; it lacks advanced customization, and its analytics and content management are more limited. Critically, while Edmodo does support multiple languages (about 16), it might not support Kazakh out-of-the-box, relying mostly on English and some major languages. For Kazakhstan, Edmodo could be a good interim tool, especially at the school level, but its limitations mean it might not scale or provide the depth needed for comprehensive online education long-term. Some tech-savvy Kazakhstani teachers did experiment with Edmodo during 2020, indicating that there is local familiarity with it.

Schoology is another LMS often used in K-12 education, offering a polished interface and features tailored to school workflows (like parent accounts, integrated gradebooks, etc.). Schoology's feature set is somewhere between Edmodo and enterprise LMSs; it is more structured for courses and assessment than Edmodo, but simpler than Blackboard. The analysis noted that Schoology's main drawback for Kazakhstan is its limited language support; at the time of review, Schoology's interface was primarily in English (and a few other languages) and did not natively support Kazakh. This could pose a barrier in schools where Kazakh is the medium of instruction. On the upside, Schoology has been used in some schools internationally to good effect and offers a free version for educators. It also supports integration of external tools and content. In Kazakhstan, a few teachers reportedly tried Schoology during the pandemic as well. The platform could potentially be localized with effort, but that would require collaboration with the provider or community.

The comparative results suggest that no single platform emerges as a perfect fit on all criteria for Kazakhstan's diverse needs, but there are clear front-runners depending on priorities. If multilingual accessibility and cost are top priorities (as they arguably should be for inclusive nationwide adoption), Moodle stands out as the most suitable. If advanced features and analytics are desired for higher education and well-resourced settings, Blackboard offers a rich solution (though at high cost). For ease of use in schools with limited ICT capacity, Edmodo or Schoology present user-friendly options, though with potential language constraints. An important takeaway is that Kazakhstan might benefit from a hybrid approach: for example, adopting an open-source platform like Moodle nationally, while allowing schools or universities flexibility to integrate other tools (like using Zoom for live classes or supplemental platforms for specific needs). The analysis also highlighted that whatever platform is used, adequate support and training must accompany it. A sophisticated LMS can fail to deliver results if teachers are not trained to utilize its features or if students find the interface confusing. During the pandemic, the lack of a unified platform strategy in Kazakhstan led to fragmentation—some schools used one system, others used another, while many used none, relying on basic tools. Going forward, a more coherent strategy (even if not a single platform for all) would likely yield better outcomes. These platform insights feed into the recommendations, especially regarding the idea that Kazakhstan could invest in developing a tailored platform or customizing an existing open-source solution to ensure that it meets local language and content requirements.

4. DISCUSSION

This study set out to evaluate Kazakhstan's distance learning experience through a combined pedagogical and socio-cultural lens, with particular attention to students' satisfaction, preferences, and capacity to sustain engagement under emergency remote learning conditions. The findings demonstrate that the effectiveness of distance learning cannot be explained by technological provision alone; rather, it emerges from the interaction between infrastructure, learner adaptability, institutional practices, and socio-cultural expectations. These findings are consistent with a growing body of international research on distance learning during the COVID-19 pandemic, which similarly highlights the central role of digital inequality and infrastructural constraints in shaping students' experiences. Studies from regions such as Sub-Saharan Africa, South Asia, and Eastern Europe demonstrate that limited access to stable internet, personal devices, and supportive learning environments significantly reduces both satisfaction and engagement in online education (Aruleba & Jere, 2022; Mathrani et al., 2023; Miao et al., 2022). Importantly, these findings should not be interpreted as merely descriptive patterns but as evidence of underlying structural mechanisms linking digital access to educational outcomes. Specifically, the results suggest that digital inequality functions as a mediating factor that shapes both students' satisfaction and their willingness to continue distance learning, thereby directly influencing the sustainability of digital education.

A key contribution of the study lies in showing that students' acceptance or rejection of distance learning is shaped primarily by their lived learning conditions. Quantitative results indicated a strong association between satisfaction with distance learning and willingness to continue using online or blended formats, while qualitative evidence clarified the mechanisms underlying this relationship. Students who benefited from stable connectivity, flexible learning schedules, and adequate digital competence were more likely to perceive distance learning positively and to sustain engagement over time. Conversely, students facing infrastructural constraints, limited interaction, or domestic responsibilities experienced distance learning as exhausting rather than empowering, leading to resistance and disengagement. These findings align with prior research emphasizing that perceived usefulness and contextual feasibility are central determinants of technology acceptance in education (Nurgaliyeva et al., 2024; Seilkhan et al., 2022). These outcomes directly address the research questions by demonstrating that willingness to continue distance learning is not driven by individual attitudes alone but is structurally conditioned by the quality of prior learning experience. This shifts the interpretation from individual preference to systemic constraint.

The pronounced urban-rural divide identified in this study reinforces digital divide theory by illustrating that inequality in access extends beyond hardware and connectivity to include unequal opportunities for sustained participation. Rural students' lower satisfaction and reduced willingness to continue online learning were not driven by negative attitudes toward technology, but by structural barriers that made consistent engagement difficult or impossible. This supports international evidence showing that emergency remote education can exacerbate existing educational inequalities when infrastructural disparities are not addressed (Miao et al., 2022; Turnbull et al., 2021). From a policy perspective, these findings suggest that expanding digital education without parallel investment in connectivity and device access risks reinforcing regional disparities rather than mitigating them. Comparable patterns have been reported in other national contexts. For example, studies in South Africa and Zimbabwe show that rural students faced greater barriers to participation due to infrastructural limitations and socio-economic inequalities, resulting in lower satisfaction and engagement with online learning (Aruleba & Jere, 2022; Hove & Dube, 2021). Similarly, research in Turkey and Indonesia indicates that students without reliable internet access or personal devices are significantly less likely to perceive distance learning as effective or sustainable (Ahadin et al., 2023; Baytak, 2022). This suggests that the urban-rural divide should be understood not simply as a geographic difference but as a manifestation of unequal access to the minimum conditions required for effective participation in digital education. In this sense, location operates as a proxy for infrastructural inequality rather than as an independent explanatory variable.

Gender-related findings further highlight the importance of socio-cultural context in shaping distance learning experiences. While no substantial gender gap was observed in overall satisfaction, qualitative evidence revealed that female students, particularly at the secondary level, faced additional challenges related to domestic responsibilities and emotional engagement. These factors constrained their ability to sustain focus and contributed to a slightly lower preference for fully online learning. Importantly, these differences were not rooted in digital competence but in gendered expectations and support structures, echoing international concerns about the differential impact of remote learning on girls in certain cultural settings (Gherheş et al., 2021). This underscores that inclusivity in digital education must address social roles and care burdens alongside technical access. These findings align with international evidence suggesting that socio-cultural perceptions of online education, including trust in digital platforms, perceived legitimacy of assessment, and

the importance of face-to-face interaction, play a crucial role in shaping students' acceptance of distance learning across diverse cultural contexts (Sikhangezile & Modise, 2020; van Deursen & van Dijk, 2019). From a critical perspective, these results suggest that resistance to online learning should not be interpreted as purely cultural conservatism but as a rational response to perceived limitations in quality, interaction, and institutional trust.

Differences between teachers' and students' perspectives further illustrate the multifaceted nature of distance learning evaluation. Teachers tended to assess distance learning primarily through its impact on learning outcomes and assessment quality, often expressing concern about reduced engagement and superficial understanding. At the same time, many teachers reported personal satisfaction with their rapid professional adaptation, viewing the period as a catalyst for developing new pedagogical skills. Students, by contrast, evaluated distance learning largely in terms of usability, flexibility, and its integration into daily life. These divergent evaluation criteria suggest that tensions between perceived learning quality and experiential convenience are central to debates over the future of online education. Effective policy responses must therefore balance concerns about educational standards with students' demonstrated preference for flexibility and autonomy.

Finally, the qualitative findings indicate that distance learning should be understood as a socio-technical process rather than a purely instructional format. The crisis-driven transition exposed gaps in digital preparedness but also revealed opportunities for developing self-regulated learning, peer collaboration, and blended educational models. As familiarity with digital tools increased, resistance declined, supporting theoretical models of educational technology adoption that emphasize experience and adaptation as drivers of acceptance. However, the persistent importance of social interaction highlights the limits of fully virtual education and reinforces the case for hybrid approaches that combine digital flexibility with face-to-face engagement. This highlights the need to move beyond descriptive evaluations toward a more systemic understanding of digital education as an uneven and context-dependent process shaped by interacting structural and socio-cultural factors.

Overall, the findings suggest that distance learning should be understood as a socio-technical practice embedded in specific institutional and cultural contexts rather than as a universally transferable instructional model. While the pandemic accelerated digital experimentation, it also revealed the limits of fully online education in sustaining motivation, interaction, and learning quality over time. The observed patterns of adaptation, resistance, and gradual acceptance align with broader theories of educational technology adoption, which emphasize experience, contextual fit, and support structures as key drivers of sustainability. Importantly, the implications of this study extend beyond the national case examined here. Education systems in similar post-Soviet and middle-income contexts, where digital infrastructure, institutional capacity, and socio-cultural expectations vary widely, may encounter comparable tensions when integrating distance learning into mainstream education. The Kazakhstani case thus offers analytically transferable insights into the conditions under which digital education can enhance resilience without exacerbating inequality. These conclusions are consistent with international evidence from other regions facing similar challenges, where digital inequality and infrastructural constraints have been identified as key factors shaping the effectiveness and sustainability of distance learning (Mathrani et al., 2023; Miao et al., 2022).

5. CONCLUSION

Kazakhstan's rapid transition to distance learning during the COVID-19 pandemic served as a large-scale stress test of the national education system, revealing both structural weaknesses and capacities for adaptation. The findings of this study demonstrate that distance learning outcomes were highly uneven and depended on a combination of infrastructural, institutional, and socio-cultural conditions rather than on technology alone.

A central conclusion is that satisfaction with distance learning strongly shaped students' and teachers' willingness to accept and sustain digital education. Where reliable connectivity, appropriate devices, functional platforms, and basic digital competencies were present, online learning was perceived as workable and, in some cases, beneficial, offering flexibility and new modes of engagement. In contrast, the absence of these enabling conditions—most notably in rural and socio-economically disadvantaged contexts—led to frustration, disengagement, and perceived learning loss. The strong association between satisfaction and readiness to continue underscores that improving the quality of distance education is essential for its long-term acceptance.

The study also highlights that digital inequality in Kazakhstan extends beyond technical access. Urban-rural disparities, gendered domestic responsibilities, and differing levels of institutional and family support significantly affected learners' ability to sustain participation in online education. These findings indicate that

resistance to distance learning was often not driven by rejection of technology itself, but by structural and socio-cultural constraints that limited meaningful engagement. Differences between teachers' and students' perspectives further emphasize the need for balanced digital education strategies. Teachers tended to evaluate distance learning through its impact on learning outcomes and assessment integrity, while students focused on usability, flexibility, and integration into daily life. Addressing this divergence requires approaches that preserve pedagogical quality while responding to learners' needs for autonomy and accessibility.

Overall, the study suggests that distance learning should be understood as a socio-technical practice embedded in specific cultural and institutional contexts. While fully online education was widely viewed as insufficient to replace face-to-face instruction, there was broad support for blended models that integrate digital tools into conventional teaching. By adopting an integrated approach that aligns technology with learner capacity, institutional support, and socio-cultural realities, Kazakhstan can leverage the lessons of the pandemic to build more resilient, inclusive, and flexible education systems in comparable post-Soviet and middle-income educational contexts.

DECLARATION

1. Conflict of interest

The authors declare no conflicts of interest.

2. Generative AI and AI-assisted technologies in the writing process

In the preparation of this manuscript, ChatGPT (version 5.2) was used in a limited and supportive capacity. The tool was applied exclusively for language editing and grammatical refinement, including improving sentence clarity, coherence, and academic tone.

3. Data availability statement

Data cannot be shared publicly because the authors' Ethics Committee has prohibited the public availability of data.

4. Ethics statement

This study was approved by the Ethics Committee of Al-Farabi Kazakh National University (IRB-A899). All participants provided written informed consent prior to their involvement in the study.

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6. Contributor Role Taxonomy (CRediT)

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