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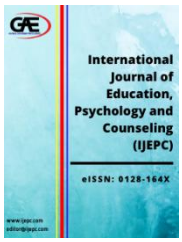

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TECHNOSTRESS IN EDUCATIONAL SETTINGS: A SYSTEMATIC LITERATURE REVIEW OF TEACHERS AND LEARNERS (2024-2026)

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Abstract:

The rapid digitalisation of education has embedded information and communication technologies (ICT) in everyday teaching and learning, yet it has also produced a distinct form of strain known as technostress. Although primary studies have multiplied since the COVID-19 period, the most recent evidence remains scattered across populations, instruments, and outcomes, and an up-to-date synthesis is lacking. This review therefore aims to consolidate the 2024 to 2026 empirical evidence on technostress in educational settings into a structured thematic map of its antecedents, consequences, and coping strategies for teachers and learners. Following a three-stage systematic literature review protocol, two databases, Scopus and ERIC, were searched with a structured string. After identification, duplicate removal, title and abstract screening, and full-text eligibility assessment under a PRISMA-style flow (Figure 1), and after quality appraisal with the Critical Appraisal Skills Programme (CASP) checklist, 52 primary studies were retained for qualitative thematic synthesis. Three themes emerged. Antecedents are driven mainly by institutional support, digital competence, and professional identity; consequences centre on emotional exhaustion and reduced satisfaction and performance for educators and on lower motivation and engagement for learners; and coping is shaped by training, institutional scaffolding, and the positive variant of strain known as techno-eustress. These findings imply that schools and universities should prioritise sustained technical and

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pedagogical support, structured digital-competence training, and workload management to buffer technostress, while future research should move beyond cross-sectional survey designs and widen coverage to under-represented settings such as rural and Global South contexts. The review contributes a current, appraisal-based evidence map to guide practice, policy, and research in digital education.

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Keywords:

Educational Technology; Learners; Systematic Literature Review; Teachers; Technostress

Introduction and Literature Review

The integration of digital technologies into education has shifted from an optional enhancement to an operational necessity. Learning management systems, video conferencing, learning analytics, mobile applications, and, most recently, generative artificial intelligence have become embedded in everyday teaching and learning. While these tools expand pedagogical possibilities, their continuous adoption also imposes psychological costs. The concept that captures these costs is technostress, defined as the psychological discomfort or strain that individuals experience when they cannot keep pace with the escalating demands that information and communication technologies place on them. Within educational settings, technostress arises when teachers and learners must manage intensified workloads, constant connectivity, frequent technological change, and the pressure to master complex systems while sustaining instructional or academic quality.

Technostress is widely conceptualised as multidimensional. The recurring sub-dimensions reported across the reviewed literature are techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty, and several studies in this review extend the construct to include emerging stressors such as new technology adoption (S. Li et al., 2024) and confirm its factorial validity through confirmatory factor analysis (Subchi et al., 2024). This multidimensional structure matters because different stressors relate to different outcomes: techno-overload and techno-invasion are frequently the strongest drivers of strain, whereas techno-uncertainty sometimes behaves inconsistently, occasionally showing positive or protective associations (Chen et al., 2026).

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The COVID-19 period intensified scholarly attention to technostress because the sudden move to remote and hybrid instruction exposed both educators and learners to abrupt, often unsupported technology use. Studies in this review situated in that transition document emotional exhaustion, sleep problems, and disrupted work-life boundaries among teachers (Labarthe-Carrara et al., 2024; Lousada et al., 2026), and reduced motivation and engagement among students (Addai et al., 2024; Sharma & Singh, 2025). Yet the literature is not uniformly negative. A growing body of work distinguishes techno-distress from techno-eustress, the positive side of strain, in which perceived usefulness, IT mindfulness, coping flexibility, and organisational support can generate constructive psychological responses and even improve satisfaction and performance over time (Nascimento et al., 2025; Zhao et al., 2024). This dual nature reframes technostress as a modifiable condition rather than a fixed outcome.

Two features of the current evidence base justify a systematic review focused tightly on 2024 to 2026. First, the phenomenon is moving quickly: generative AI, smart classrooms, and learning analytics dashboards are new stressor sources that earlier reviews could not have covered (Alfoudari & Durugbo, 2026; Kohnke et al., 2024; Liu et al., 2024). Second, the evidence spans heterogeneous populations, teachers across all levels as well as learners, with differing instruments and mixed findings, which makes a structured consolidation valuable for both researchers and policymakers. While the title foregrounds teachers, the most recent corpus repeatedly couple's educator and learner experiences within shared technological environments, and the review therefore synthesises evidence across educational settings while keeping the teaching workforce as its primary lens.

Accordingly, the objective of this review is to synthesise the most recent (2024 to 2026) empirical evidence on technostress in educational settings into a coherent thematic map of its antecedents, consequences, and coping strategies. This objective is pursued through three research questions:

- RQ1. What are the key antecedents and determinants contributing to technostress in technology-enabled educational settings?
- RQ2. How does technostress affect the well-being, performance, and educational outcomes of teachers and learners in technology-driven environments?
- RQ3. What coping mechanisms, resilience strategies, and technology adaptation practices are used to manage technostress in digital learning environments?

Materials and Methods

This review followed the three-stage systematic review process of planning, conducting, and reporting. Planning specified the research questions, the review protocol, the databases, and the inclusion and exclusion criteria in advance. Conducting covered the identification of research, the selection of primary studies, quality appraisal, data extraction, and synthesis. Reporting presents the screening flow, the appraisal outcomes, and the thematic findings. The selection and screening were documented using a PRISMA-style flow so that the rationale and methods remain open to scrutiny.

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Identification

Two databases were searched: Scopus and ERIC. Scopus was selected for its broad multidisciplinary coverage and strong indexing of peer-reviewed journals, while ERIC was selected for its specialised focus on educational research. The search string combined technostress-related terms with education-related population terms, and the database-level limits (language, document type, publication year, and subject area) were embedded directly in the query, as shown in Table 1. Because these limits were applied within the search itself, the records identified already reflect the language, year, document-type, and subject restrictions; the identified set therefore represents the filtered database output rather than an unfiltered hit count. The structured search returned 66 records from Scopus and 36 records from ERIC, giving 102 records identified for screening. The date of access was June 2026.

Table 1: Search strings

Database	Search string	Date of access
Scopus	TITLE-ABS-KEY (("technostress" OR "technology stress" OR "digital stress" OR "tech stress") AND (teacher OR educator OR "school staff" OR "instructor*" OR "faculty")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (PUBYEAR , "2024") OR LIMIT-TO (PUBYEAR , "2025") OR LIMIT-TO (PUBYEAR , "2026")) AND (LIMIT-TO (SUBJAREA , "SOCI"))	June 2026
ERIC	(("technostress" OR "technology stress" OR "digital stress" OR "tech stress") AND (teacher OR educator OR "school staff" OR "instructor*" OR "faculty")) pubyearmin:2024 pubyearmax:2026	June 2026

Source: Authors' own compilation.

Screening

After identification, duplicate records that appeared in both databases were removed. Cross-database matching of titles identified 24 duplicates, which were eliminated to prevent the overrepresentation of any single study, leaving 78 unique records. The 78 records were then screened against the inclusion and exclusion criteria defined in the protocol (Table 2). Screening at the title and abstract level removed records that fell outside the scope of technostress in educational settings, were not empirical, or did not address the research questions. Restricting the corpus to English-language, peer-reviewed journal articles published from 2024 onward, within the social-sciences domain, kept the synthesis aligned with current, scholarly, and discipline-relevant evidence.

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Table 2: Inclusion And Exclusion Criteria

Criterion	Inclusion	Exclusion
Language	English	Non-English
Timeline	2024 to 2026	Before 2024
Literature type	Journal (research article)	Conference, book, review article
Publication stage	Final	In press
Subject area	Social sciences	Outside social sciences
Focus	Empirical study of technostress in educational settings	Non-empirical; not focused on technostress

Source: Authors' own compilation.

Eligibility

The remaining records were assessed for eligibility through full-text examination of their alignment with the research questions. At this stage, records were excluded when the full text was not retrievable, when the primary emphasis differed substantially from technostress despite surface-level keyword matches, or when the publication was itself a secondary study. Two review-type publications, a scientometric analysis and a systematic review, were excluded at this stage because the review targets primary studies. One further record was excluded because it fell outside the 2024 to 2026 publication window. After eligibility assessment, 52 primary studies were retained for quality appraisal and synthesis. Table 3 summarises the flow. Figure 1 presents the same selection process as a PRISMA flow diagram.

Table 3: PRISMA-Style Selection Flow

Stage	Action	Records
Identification	Records identified through database searching (Scopus n = 66; ERIC n = 36)	102
Duplicates	Duplicate records removed	-24
	Unique records screened	78
Screening	Records excluded at title and abstract (out of scope, non-empirical)	-16
Eligibility	Reports assessed for eligibility at full text	62
	Records excluded at full text (no full-text access or off-objective n = 7; review articles n = 2; published before 2024 n = 1)	-10
Included	Primary studies included in qualitative synthesis	52

Source: Authors' own compilation.

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A note on transparency: the endpoints of this flow (102 identified, 78 after de-duplication, and 52 included) are derived directly from the database export files and the final coded corpus. The split between the title and abstract screening stage and the full-text eligibility stage reflects the review team's recorded screening decisions.

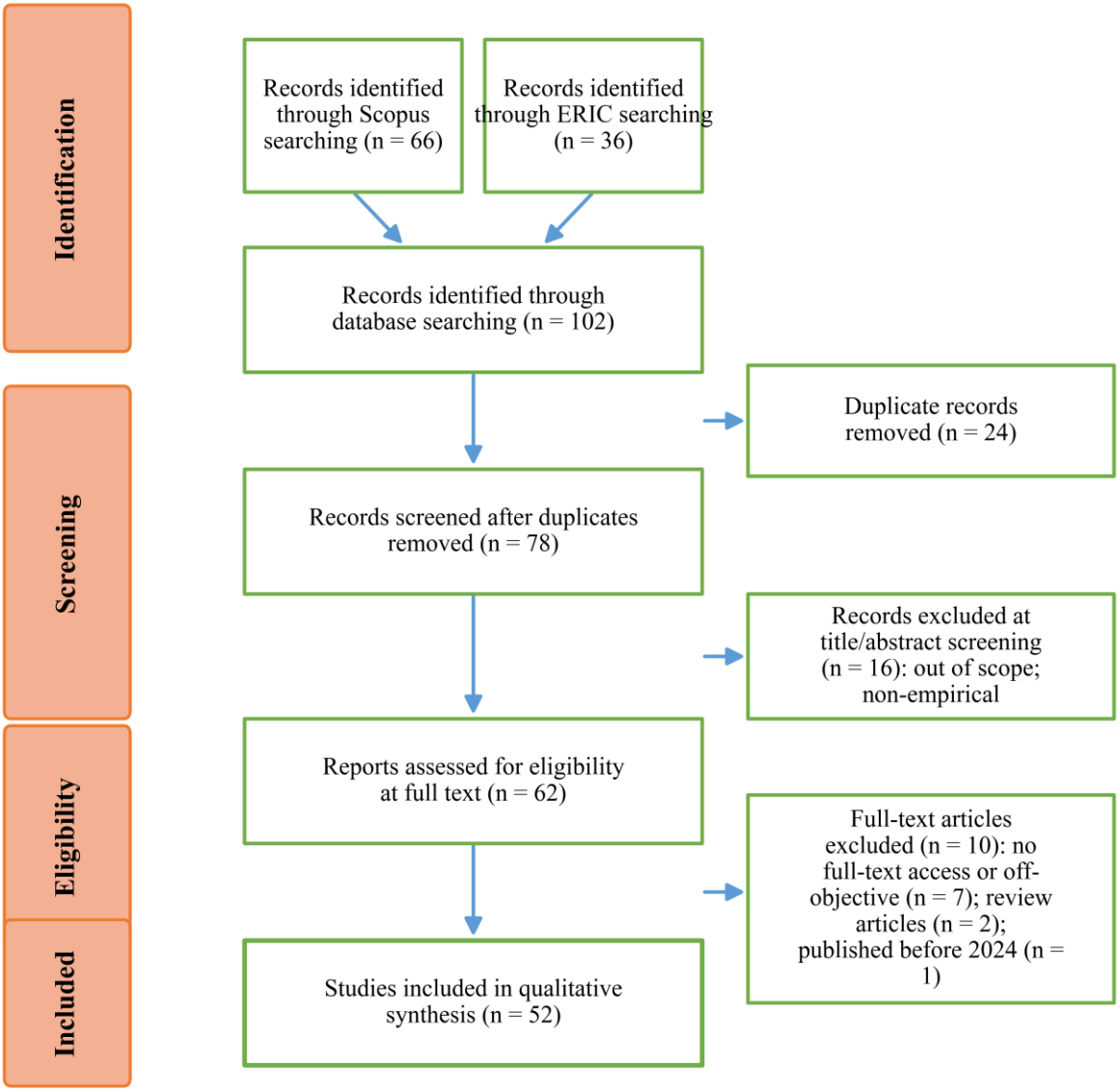

Figure 1. PRISMA Flow Diagram of The Study Selection Process.

Quality Appraisal

Each of the 52 studies was appraised using the Critical Appraisal Skills Programme (CASP) approach, which evaluates the clarity of aims, the appropriateness of methodology and design, the adequacy of recruitment and sampling, the rigour of measurement and analysis, the clarity of the statement of findings, and the value of the research. Because the appraisal was conducted on the basis of the information reported in abstracts and bibliographic metadata, the ratings should be read as indicative rather than exhaustive. Studies were assigned an overall rating of High or Medium quality. Of the 52 studies, 26 were rated High and 26 were rated Medium; no

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study was rated Low. Studies rated High typically reported large validated samples, clearly specified designs such as structural equation modelling or longitudinal panels, and explicit analytic procedures, while studies rated Medium were generally smaller, more exploratory, or reported insufficient methodological detail at the abstract level. The per-study ratings appear in the data extraction matrix (Table 4).

Data Abstraction and Thematic Analysis

An integrative, qualitative thematic synthesis was used to consolidate the evidence. Each study was coded for its population, country where stated, design and method, sample, principal findings, and thematic placement. Through iterative comparison, the coded findings were grouped into three themes that map directly onto the research questions: antecedents and determinants (RQ1), consequences for well-being, performance, and educational outcomes (RQ2), and coping, resilience, and adaptation strategies (RQ3). The full data extraction matrix is presented in Table 4, and the narrative synthesis follows in Section 3.

Results and Discussion

The 52 included studies were distributed across the three themes as follows: 15 studies addressed antecedents and determinants, 23 addressed consequences, and 14 addressed coping and resilience. The studies were predominantly quantitative, using survey designs analysed with structural equation modelling, regression, or clustering, with a smaller number of mixed-methods, qualitative, and intervention designs. The synthesis below addresses each theme in turn. Table 5 highlights the dominant studies that represent each theme.

Theme 1: Antecedents and Determinants of Technostress

The first theme addresses RQ1 and concerns what gives rise to technostress in technology-rich educational settings. Three clusters of determinants recurred across the 15 studies: institutional and environmental factors, professional competence and digital literacy, and individual dispositions.

The first cluster locates the origins of technostress in the surrounding institutional and technological environment. Several studies converge on school or institutional support as a decisive factor. Using person-environment fit theory, (Zheng et al., 2025) found that teachers' value beliefs and school support significantly shaped both technostress and satisfaction among 681 Chinese K-12 teachers, although technostress did not directly determine satisfaction. In parallel studies of learning analytics adoption, (Alfoudari & Durugbo, 2026; Kohnke et al., 2024; Liu et al., 2024) showed that school support and subjective norms influenced technostress and self-efficacy, with technostress acting as a moderator of the relationship between intention and actual technology use. The quality of the technology itself also matters: (Alfoudari & Durugbo, 2026; Kohnke et al., 2024; Liu et al., 2024) reported that higher perceived service quality in smart classrooms reduced university instructors' technostress and strengthened their continuance intentions, suggesting that well-designed systems carry stress-relieving properties. For newer tools, (K. Wang et al., 2024) and (C. Wang et al., 2026) found that institutional and pedagogical resources shaped teachers' engagement with AI-assisted and generative-AI tools, although technostress did not always predict behavioural intention directly.

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The second cluster frames professional competence, pedagogical capability, and digital literacy as protective mechanisms. (W. Li et al., 2026) demonstrated, with a large sample of 3,052 primary and secondary teachers, that technostress mediates the relationship between school digital initiatives and teachers' digital competence, and that a strong professional identity buffers this effect. Consistent with this, (Vásquez-Pajuelo et al., 2024) reported that digital competencies accounted for a substantial share of the variance in technostress among university instructors, and (Arslan & Şahin, 2024), in a large sample of 3,143 teachers in Türkiye, found a significant negative correlation between problem-solving skills and technostress. (Güner et al., 2025) added a developmental dimension, showing that technostress mediated the path from pre-service teacher identity to technological pedagogical content knowledge. Taken together, these studies position competence as a renewable resource that lowers the likelihood and intensity of strain.

The third cluster highlights individual differences and psychological dispositions. (Efilti et al., 2024) reported moderate technostress among science faculty in the Kyrgyz Republic, with seniority associated with higher strain on some sub-dimensions. (Ariño-Mateo et al., 2024) showed that the personality trait of conscientiousness related to technostress indirectly through organisational dehumanisation, indicating that workplace perception mediates dispositional effects. (S. Li et al., 2024) used K-means clustering to identify distinct teacher groups defined by their technostress profiles and added new technology adoption as an emerging stressor, while (Sarra et al., 2025) used psychometric network analysis to link technostress with negative thinking, resistance to innovation, and burnout. The validation work of (Subchi et al., 2024) underpins this cluster by confirming the multidimensional structure of the technostress construct. Overall, Theme 1 indicates that technostress is co-produced by environmental, competence-related, and dispositional factors, and that technostress frequently operates not only as an outcome but as a mediator within technology-adoption models.

Theme 2: Consequences of Technostress on Well-Being, Performance, and Educational Outcomes

The second theme addresses RQ2 and synthesises 23 studies on the effects of technostress. The evidence converges on four interrelated consequences: diminished psychological and physical well-being, reduced performance and productivity, weakened engagement and continuance, and adverse learner outcomes.

The clearest and most consistent consequence is the erosion of well-being. (Lousada et al., 2026) documented a multidimensional imbalance across physical, emotional, cognitive, social, and existential domains among higher education teachers during remote teaching, driven by workload and blurred boundaries. (Labarthe-Carrara et al., 2024) showed that high job demands increased technostress, which in turn related to teachers' sleep problems, with organisational trust acting as a protective resource. Beyond psychological strain, (Tatković et al., 2026) found that digital stress significantly predicted psychosomatic symptoms among teachers, while self-efficacy played a protective role, demonstrating that the consequences of technostress extend into physical health.

A second consequence is reduced performance and productivity. (Tu et al., 2025) found, among 378 STEM teachers, that technostress creators drove burnout upward while depressing job satisfaction, organisational commitment, and work performance, with burnout carrying the

effect. (Dekawati et al., 2025) similarly reported that technostress reduced the work performance of elementary teachers, though organisational commitment partially offset the effect. (Basheer Amin et al., 2024) found that technostress lowered educator productivity in Jordanian higher education, with a more pronounced effect among male educators, and (Chen et al., 2026) showed, in a large sample of 2,000 K-12 teachers, that techno-complexity and techno-insecurity elevated emotional exhaustion, which then dampened ICT-enabled productivity. Emotional exhaustion recurs across these studies as the central pathway from strain to diminished performance.

A third consequence concerns engagement, satisfaction, and the intention to continue using technology. (K. Wang et al., 2025) found that technostress reduced teachers' continuance intention to teach online even when other conditions were favourable, and (Ismail et al., 2026) reported the same pattern among TVET educators, where technostress lowered satisfaction and continuance despite recognition of the tools' usefulness. (Zhang & Jia, 2025), using a time-lagged survey and an experience-sampling design, demonstrated that technostress increased counterproductive work behaviour through emotional exhaustion, an effect weakened by positive teacher-student relationships. (Toscano et al., 2024) added nuance by showing that technostress mediated a negative indirect path from social expectations to teacher satisfaction in music education, even while the direct path remained positive.

A fourth consequence extends to learners. Several studies show that technostress depresses students' motivation, engagement, and well-being. (Addai et al., 2024) found that technostress reduced university students' academic motivation and psychological well-being, partially mitigated by technological literacy. (Sharma & Singh, 2025) reported that technostress affected the behavioural engagement of Generation Z students most strongly, particularly among younger and female students, and (Pang & Wang, 2025) identified perceived technostress as the mechanism linking mobile-app addiction and privacy concerns to lower subjective well-being and academic expectancy. (Saleem et al., 2024) showed that technostress reduced the quality of online learning unless buffered by instructor and university support, and (Alanazi et al., 2026) found that technostress and exhaustion mediated student engagement with mobile learning. In sum, Theme 2 demonstrates that technostress produces wide-ranging harms for both educators and learners, channelled chiefly through emotional exhaustion and reduced self-efficacy, and moderated by support, trust, and digital literacy.

Theme 3: Coping Mechanisms, Resilience, and Technology Adaptation Strategies

The third theme addresses RQ3 and synthesises 14 studies that reframe technostress as a manageable condition. Across this theme, coping is treated as a dynamic process shaped by individual resources, institutional scaffolding, and the positive potential of techno-eustress.
A first stream emphasises resilience and cognitive resources as buffers. (Qi & Yang, 2024), in a mixed-methods study of adolescents, found a strong inverse relationship between digital resilience and technological stress across school, family, and leisure settings. (Avcı, 2026) showed that digital literacy, internet self-efficacy, and cognitive flexibility operated as serial mediators that reduced technostress and academic burnout while promoting techno-eustress, illustrating a layered cognitive pathway. (Al-Abyadh, 2025) found that psychological resilience moderated the relationship between technostress and student vitality. These studies suggest that resilience is not merely a stable trait but a developable capability.

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A second stream highlights structured training and institutional support. (Ahmed Abdel-Al Ibrahim & Hashemifardnia, 2024) demonstrated, through an experimental design, that techno-competence workshops significantly reduced technostress while improving academic enjoyment, autonomy, and language achievement. (Kohnke et al., 2024) found that professional development, gradual technology integration, and supportive communities mitigated technostress among English language teachers using generative AI. (Petrovic et al., 2026) showed that a digital stress-management programme improved pre-service teachers' well-being and coping self-efficacy, and (Öksüzoğlu & Tünkler, 2026) identified practical coping strategies among social studies teachers, including seeking technical support, time management, and pedagogical upskilling, with school support playing a decisive role. (Fernández-Arias et al., 2024) added that teaching experience itself functioned as a natural coping enhancer, with more experienced professors reporting lower digital stress even when their digital competence was comparable.

A third stream develops the dual-process view of technostress by foregrounding techno-eustress. (Nascimento et al., 2025), using a two-wave longitudinal design with 712 higher education teachers, showed that perceived usefulness, IT mindfulness, coping flexibility, and synergic literacy fostered positive psychological responses that improved job satisfaction and performance over time. (Zhao et al., 2024) found that personal and organisational coping resources promoted techno-eustress and learning performance in IT training, and (Q. Wang et al., 2024) demonstrated that technostress moderated the effect of facilitating conditions on students' digital informal learning, determining whether technological environments became enabling or inhibiting. The measurement work of (Nascimento & Correia, 2025), who validated a flexible coping scale, and the engagement-focused study of (Ghanizadeh et al., 2026), who found that work engagement and job commitment buffered the negative effect of technostress on professional development, complete this picture. Theme 3 thus marks a conceptual shift from stress reduction alone toward a dual-process model in which coping and resilience simultaneously reduce harm and unlock the positive potential of technology use.

Data Extraction Matrix

Table 4: Overview of Included Studies (Grouped by Theme)

#	Study (Year)	Country	Design / method	Theme
1	(Liu et al., 2024)	China	PLS-SEM survey	T1
2	(Efilti et al., 2024)	Kyrgyz Republic	Relational survey	T1
3	(W. Li et al., 2026)	China	Questionnaire SEM	T1
4	(Sarra et al., 2025)	Italy	Psychometric network analysis	T1
5	(Arslan & Şahin, 2024)	Türkiye	Regression, ANOVA, MANOVA	T1
6	(Alfoudari & Durugbo, 2026)	GCC region	PLS-SEM	T1
7	(Zheng et al., 2025)	China	SEM (P-E fit)	T1
8	(C. Wang et al., 2026)	China	Latent profile analysis	T1

9	(K. Wang et al., 2024)	China	SEM	T1
10	(Liu et al., 2025)	China	PLS-SEM	T1
11	(S. Li et al., 2024)	China (Hunan)	Survey + K-means clustering	T1
12	(Vásquez-Pajuelo et al., 2024)	Peru	Logistic regression	T1
13	(Subchi et al., 2024)	Indonesia	Confirmatory factor analysis	T1
14	(Güner et al., 2025)	Not specified	SEM	T1
15	(Ariño-Mateo et al., 2024)	Not specified	Moderated mediation (PROCESS)	T1
16	(Lousada et al., 2026)	Lithuania	Mixed-methods	T2
17	(Labarthe-Carrara et al., 2024)	Uruguay	SEM	T2
18	(Addai et al., 2024)	Not specified	Time-lagged cross-sectional	T2
19	(Pang & Wang, 2025)	China	Survey (SSO framework)	T2
20	(Tatković et al., 2026)	Croatia	CFA validation	T2
21	(Sharma & Singh, 2025)	India	Survey regression	T2
22	(Saleem et al., 2024)	Not specified	Survey moderation	T2
23	(J. Wang, 2024)	China	SEM, regression	T2
24	(LeRoy et al., 2024)	Not specified	Survey (TAM)	T2
25	(Jurić et al., 2026)	Not specified	Survey, regression	T2
26	(Dekawati et al., 2025)	Indonesia	PLS-SEM	T2
27	(K. Wang et al., 2025)	China	SEM (COACTIV)	T2
28	(Tu et al., 2025)	China (Zhejiang)	SEM (JD-R)	T2
29	(Levante et al., 2025)	Italy	Sequential mediation	T2
30	(Alanazi et al., 2026)	Saudi Arabia	UTAUT2 survey	T2
31	(Ismail et al., 2026)	Malaysia	PLS-SEM (ECM)	T2
32	(Basheer Amin et al., 2024)	Jordan	Survey	T2
33	(Heredia-Gálvez et al., 2026)	Ecuador	CFA / SEM	T2
34	(Pagán-Garbín et al., 2024)	Spain (Murcia)	Correlational + ANN	T2
35	(Chen et al., 2026)	China	SEM (stressor-strain-outcome)	T2
36	(Zhang & Jia, 2025)	Not specified	Time-lagged survey + ESM	T2
37	(Abdullaeva et al., 2024)	Not specified	Quasi-experimental (ANCOVA)	T2
38	(Toscano et al., 2024)	Italy	Cross-sectional SEM	T2
39	(Qi & Yang, 2024)	Not specified	Mixed-methods	T3

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40	(Ahmed Abdel-Al Ibrahim & Hashemifardnia, 2024)	Iran	Mixed-methods experiment	T3
41	(Fernández-Arias et al., 2024)	Not specified	Quantitative survey	T3
42	(Zhao et al., 2024)	Not specified	Survey	T3
43	(Al-Abyadh, 2025)	Egypt and KSA	PLS-SEM	T3
44	(Kohnke et al., 2024)	Hong Kong	Qualitative interviews	T3
45	(Avcı, 2026)	Türkiye	Serial mediation	T3
46	(Nascimento et al., 2025)	Not specified	Two-wave longitudinal	T3
47	(Petrovic et al., 2026)	Not specified	Pre-post intervention	T3
48	(Q. Wang et al., 2024)	China	SEM	T3
49	(Nascimento & Correia, 2025)	Portugal	Scale validation	T3
50	(Ghanizadeh et al., 2026)	Not specified	SEM	T3
51	(Öksüzoğlu & Tünkler, 2026)	Not specified	Phenomenological	T3
52	(Al Issa et al., 2024)	Bahrain	Survey	T3

Source: Authors' own compilation. Full data-extraction matrix in Appendix A.

Table 5: Dominant Studies Representing Each Theme

Theme	Research question	Studies (n)	Representative studies	Core synthesised finding
Antecedents and determinants of technostress	RQ1	15	W. Li et al. (2026); Arslan & Şahin (2024); Liu et al. (2024); Zheng et al. (2025)	Institutional and school support, digital competence, and professional identity are the dominant drivers; individual dispositions such as conscientiousness and problem-solving skill condition the level of strain.
Consequences of technostress	RQ2	23	Chen et al. (2026); Tu et al. (2025); Ismail et al. (2026); Pang & Wang (2025)	Emotional exhaustion and reduced job satisfaction, performance, and continuance intention recur for educators, while lower motivation, engagement, and well-being recur for learners.
Coping, resilience, and technology adaptation	RQ3	14	Nascimento & Correia (2025); Fernández-Arias et al. (2024); Avcı (2026); Kohnke et al. (2024)	Digital competence, training, and institutional scaffolding buffer strain, and techno-eustress and coping flexibility can turn technology use into an enabling rather than harmful experience.

Source: Authors' own compilation.

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Conclusion

This systematic review consolidated 52 primary studies published between 2024 and 2026 on technostress in educational settings, addressing its antecedents, consequences, and the strategies used to manage it. In answer to RQ1, technostress is co-produced by institutional and environmental conditions, professional competence and digital literacy, and individual dispositions, and it frequently operates as a mediating mechanism within technology-adoption models rather than as a simple end-state. In answer to RQ2, technostress carries wide-ranging consequences for both educators and learners, undermining psychological and physical well-being, performance and productivity, engagement and continuance, and learner motivation, with emotional exhaustion and reduced self-efficacy as the dominant pathways. In answer to RQ3, these harms are not inevitable: digital competence, resilience, structured training, institutional support, and the cultivation of techno-eustress can buffer strain and, in some conditions, convert technology use into a source of satisfaction and improved performance.

The practical implications are threefold. First, institutions should treat technostress mitigation as a precondition for, not a by-product of, digital transformation, prioritising service quality, technical support, and supportive leadership. Second, sustained investment in teachers' and learners' digital competence and pedagogical capability functions as a renewable protective resource. Third, well-being frameworks and structured coping interventions, including training and stress-management programmes, should be integrated into teacher education and institutional policy.

Several limitations qualify these conclusions. The review covered a narrow three-year window and only two databases, Scopus and ERIC, and was restricted to English-language journal articles in the social sciences, which may exclude relevant evidence in other languages, document types, or disciplines. The quality appraisal relied on information available in abstracts and metadata rather than full-text coding, so the CASP ratings are indicative. The corpus also spans heterogeneous populations and instruments, which supports breadth of mapping but limits direct comparability. Future research should pursue longitudinal and intervention designs that test causal pathways and the temporal dynamics of techno-eustress, extend the evidence base beyond the dominant survey-and-SEM paradigm, and examine under-represented contexts and languages. A consolidated and continuously updated evidence map of this kind can help researchers, institutions, and policymakers manage the digital demands placed on teachers and learners while preserving their well-being and effectiveness.

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Ethics Statement: This study is a systematic literature review based entirely on previously published, publicly available research articles. It did not involve any human participants, animals, or the collection of primary or sensitive data, and therefore did not require ethical approval. The review was conducted in accordance with accepted academic integrity and ethical publishing standards.

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Appendix A. Characteristics and Quality Appraisal of the 52 Included Studies (Full Data-Extraction Matrix)

#	Study (Year)	Country	Design / method	Sample	Key finding	Theme	CASP
1	(Liu et al., 2024)	China	PLS-SEM survey	300 K-12 teachers	TPACK and school support predict use; technostress moderates intention-behaviour	T1	High
2	(Efilti et al., 2024)	Kyrgyz Republic	Relational survey	274 science faculty	Moderate technostress; seniority linked to higher strain	T1	Medium
3	(W. Li et al., 2026)	China	Questionnaire SEM	3,052 teachers	Technostress mediates digital initiatives to competence; identity moderates	T1	High
4	(Sarra et al., 2025)	Italy	Psychometric network analysis	430 teachers	Technostress links to negative thinking, resistance, burnout	T1	Medium
5	(Arslan & Şahin, 2024)	Türkiye	Regression, ANOVA, MANOVA	3,143 teachers	Problem-solving skills negatively correlated with technostress	T1	High
6	(Alfoudari & Durugbo, 2026)	GCC region	PLS-SEM	387 instructors	Service quality lowers technostress, raises continuance	T1	High
7	(Zheng et al., 2025)	China	SEM (P-E fit)	681 K-12 teachers	Value beliefs and school support shape technostress; no direct link to satisfaction	T1	High
8	(C. Wang et al., 2026)	China	Latent profile analysis	1,895 pre-service teachers	Techno-overload and insecurity define GenAI attitude profiles	T1	High
9	(K. Wang et al., 2024)	China	SEM	312 K-12 teachers	TPACK, agency, autonomy predict intention; technostress not significant	T1	High
10	(Liu et al., 2025)	China	PLS-SEM	300 teachers	School support affects technostress; technostress predicts intention	T1	High
11	(S. Li et al., 2024)	China (Hunan)	Survey + K-means clustering	Teachers	Five stressors plus new technology adoption; five teacher clusters	T1	Medium

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12	(Vásquez-Pajuelo et al., 2024)	Peru	Logistic regression	120 instructors	Digital competencies explain large share of technostress variance	T1	Medium
13	(Subchi et al., 2024)	Indonesia	Confirmatory factor analysis	212 teachers/lecturers	Validates multidimensional technostress instrument	T1	Medium
14	(Güner et al., 2025)	Not specified	SEM	926 pre-service math teachers	Technostress mediates teacher identity to TPACK	T1	High
15	(Ariño-Mateo et al., 2024)	Not specified	Moderated mediation (PROCESS)	190 adults (majority teachers)	Conscientiousness relates to technostress via organisational dehumanisation	T1	Medium
16	(Lousada et al., 2026)	Lithuania	Mixed-methods	385 HE teachers	Multidimensional well-being imbalance across five domains	T2	High
17	(Labarthe-Carrara et al., 2024)	Uruguay	SEM	351 teachers	High demands raise technostress and sleep problems; trust buffers	T2	High
18	(Addai et al., 2024)	Not specified	Time-lagged cross-sectional	349 university students	Technostress lowers motivation and well-being; literacy mediates	T2	Medium
19	(Pang & Wang, 2025)	China	Survey (SSO framework)	605 university students	Technostress mediates app addiction and privacy to lower well-being	T2	High
20	(Tatković et al., 2026)	Croatia	CFA validation	152 teachers	Digital stress predicts psychosomatic symptoms; self-efficacy protective	T2	Medium
21	(Sharma & Singh, 2025)	India	Survey regression	467 students	Technostress most affects behavioural engagement; vulnerable groups higher	T2	Medium
22	(Saleem et al., 2024)	Not specified	Survey moderation	392 university students	Technostress lowers online learning quality; support buffers	T2	High
23	(J. Wang, 2024)	China	SEM, regression	426 EFL students	Digital literacy predicts technostress and academic productivity	T2	Medium
24	(LeRoy et al., 2024)	Not specified	Survey (TAM)	University students	Required webcam use linked to student technostress	T2	Medium

25	(Jurić et al., 2026)	Not specified	Survey, regression	Primary teachers	Digital competences raise well-being; technostress not an independent predictor	T2	Medium
26	(Dekawati et al., 2025)	Indonesia	PLS-SEM	162 teachers	Technostress lowers performance; organisational commitment mediates	T2	Medium
27	(K. Wang et al., 2025)	China	SEM (COACTIV)	573 teachers	Technostress lowers continuance; support and resilience mediate	T2	High
28	(Tu et al., 2025)	China (Zhejiang)	SEM (JD-R)	378 STEM teachers	Stressors raise burnout, lower satisfaction and performance; inhibitors buffer	T2	High
29	(Levante et al., 2025)	Italy	Sequential mediation	388 female teachers	Coping lowers burnout via self-efficacy and reduced technostress	T2	High
30	(Alanazi et al., 2026)	Saudi Arabia	UTAUT2 survey	264 students	Technostress and exhaustion mediate mobile-learning engagement	T2	Medium
31	(Ismail et al., 2026)	Malaysia	PLS-SEM (ECM)	271 TVET educators	Technostress lowers satisfaction and continuance	T2	High
32	(Basheer Amin et al., 2024)	Jordan	Survey	500 educators	Technostress lowers productivity, more so for male educators	T2	Medium
33	(Heredia-Gálvez et al., 2026)	Ecuador	CFA / SEM	327 educators	Validates technostress scale; fatigue and anxiety central	T2	Medium
34	(Pagán-Garbín et al., 2024)	Spain (Murcia)	Correlational + ANN	168 teachers	Technostress links to burnout; model predicts resilience well	T2	Medium
35	(Chen et al., 2026)	China	SEM (stressor-strain-outcome)	2,000 K-12 teachers	Techno-complexity and insecurity raise exhaustion, lower productivity	T2	High
36	(Zhang & Jia, 2025)	Not specified	Time-lagged survey + ESM	352 + 230 teachers	Technostress raises counterproductive behaviour via exhaustion	T2	High

37	(Abdullaeva et al., 2024)	Not specified	Quasi-experimental (ANCOVA)	70 EFL learners	Digital literacy lowers technostress and anxiety, raises enjoyment	T2	Medium
38	(Toscano et al., 2024)	Italy	Cross-sectional SEM	108 conservatory teachers	Technostress mediates social expectations to satisfaction	T2	Medium
39	(Qi & Yang, 2024)	Not specified	Mixed-methods	Adolescents (12-18)	Digital resilience inversely related to technological stress	T3	High
40	(Ahmed Abdel-Al Ibrahim & Hashemifardnia, 2024)	Iran	Mixed-methods experiment	96 EFL learners	Techno-competence workshops lower technostress, raise achievement	T3	High
41	(Fernández-Arias et al., 2024)	Not specified	Quantitative survey	1,240 professors	Teaching experience mitigates digital teaching stress	T3	High
42	(Zhao et al., 2024)	Not specified	Survey	644 graduate students	Coping resources foster techno-eustress and learning performance	T3	Medium
43	(Al-Abyadh, 2025)	Egypt and KSA	PLS-SEM	527 students	Resilience moderates technostress to vitality	T3	Medium
44	(Kohnke et al., 2024)	Hong Kong	Qualitative interviews	16 instructors	Professional development and gradual integration mitigate technostress	T3	High
45	(Avcı, 2026)	Türkiye	Serial mediation	677 students	Digital literacy and cognitive flexibility raise eustress, lower burnout	T3	High
46	(Nascimento et al., 2025)	Not specified	Two-wave longitudinal	712 HE teachers	Usefulness and IT mindfulness raise eustress, satisfaction, performance	T3	High
47	(Petrovic et al., 2026)	Not specified	Pre-post intervention	52 pre-service teachers	Digital stress-management programme improves well-being and coping	T3	Medium
48	(Q. Wang et al., 2024)	China	SEM	385 undergraduates	Technostress moderates facilitating conditions to informal learning	T3	Medium

49	(Nascimento & Correia, 2025)	Portugal	Scale validation	1,107 HE teachers	Validates flexible coping with technostress scale	T3	High
50	(Ghanizadeh et al., 2026)	Not specified	SEM	581 teachers	Engagement and commitment buffer technostress effect on development	T3	Medium
51	(Öksüzoğlu & Tünkler, 2026)	Not specified	Phenomenological	5 social studies teachers	Coping via support-seeking, time management, upskilling; school support key	T3	Medium
52	(Al Issa et al., 2024)	Bahrain	Survey	304 students	Technostress inhibitor mediates online student engagement	T3	Medium

Source: Authors' own compilation.