OmniaScience

Journal of Technology and Science Education

JOTSE, 2026 – 16(1): 147-162 – Online ISSN: 2013-6374 – Print ISSN: 2014-5349

https://doi.org/10.3926/jotse.3469

TECHNOSTRESS AS A PSYCHOSOCIAL RISK: A SYSTEMATIC LITERATURE REVIEW ON CREATORS, INHIBITORS AND MENTAL HEALTH IMPACTS IN UNIVERSITY TEACHING STAFF

Sonnia Alexandra Heredia-Gálvez[1*], Pedro Javier Millán-Barroso[2]

[1]Universidad de las Fuerzas Armadas (Ecuador)

[2]Universidad Internacional de La Rioja (Spain)

Corresponding author: saheredia2@espe.edu.ec

pedrojavier.millan@unir.net

Received April 2025

Accepted January 2026

Abstract

The analysis of technostress has become important in the global context due to the impact of changing work patterns that emerged from the pandemic. This systematic review compiles the analysis of research relating technostress to two categories: mental health and creators/inhibitors. The search for articles was conducted in the following databases: Scopus, Web of Science, Scielo, Proquest Education and Proquest Psychology. A total of 219 studies were collected and reviewed. A screening using the PRISMA 2020 process returned 15 articles that met these eligibility criteria: belonging to a population of university teachers, peer-reviewed publications and papers analysing the technostress/mental health relationship or technostress/creators-inhibitors. In the technostress creators/inhibitors category, it is highlighted that techno-overload, techno-invasion and contextual uncertainty factors are the most frequent motivators of technostress. In the technostress/mental health category, fatigue stands out as the most common factor of depression and anxiety. The review of the studies leads to the conclusion that there are specific creators and inhibitors of technostress, including ergonomics and work restructuring, and that the relationship between technostress and mental health is actual and direct.

Keywords **–** University faculty, Technostress, Information and communication technologies, Mental health, Telework.

To cite this article:

Heredia-Gálvez, S.A., & Millán-Barroso, P.J. (2026). Technostress as a psychosocial risk: A systematic literature review on creators, inhibitors and mental health impacts in university teaching staff. *Journal of Technology and Science Education,* 16(1), 147-162. https://doi.org/10.3926/jotse.3469

---

1. Introduction

Information and communication technologies (ICTs) have contributed to improving processes of productive, social and academic transformation. "However, as more people connect to multimedia devices to share information and take advantage of the possibilities offered to them, cases of media addiction are increasing at a dangerous rate" (Moreno-Guerrero, Gómez-García, López-Belmonte & Rodríguez-Jiménez, 2020: page 2) because there are also factors related to technology that have generated various

physical and psychosocial conditions. The latter concern social, cognitive and emotional elements of the subjects (Orlikowski & Iacono, 2001) and pathologies related to feelings of isolation have been detected (Losada & Lanuque, 2021): frustration, overload and stress (Tacy, 2016). From the academic field, it has been shown that difficulties in adapting to the technological environment have generated stress (Estrada-Muñoz, Castillo, Vega-Muñoz & Boada-Grau, 2020).

Although the effects of technology had already been analysed for years, there has been a remarkable profusion of studies on the various consequences of forcing millions of people—with little or no familiarity with ICTs—to incorporate them into their professional lives as a result of confinement during the COVID-19 pandemic. The social isolation measures adopted worldwide forced an unexpected transformation in production processes, incorporating the notion of teleworking into public vocabulary. Ensuring access to education meant the sudden rise of distance learning or tele-education as the only possible modalities, given the prohibition of social contact (Sumba-Nacipucha, Cueva-Estrada, Conde-Lorenzo & Mármol-Castillo, 2020). Urgency and, above all, the limited ICT skills of teachers, students, and families —boldly assuming they had adequate devices and connectivity— led to the implementation of a mostly improvised (and therefore weakly structured) remote education model (Nang, Maat & Mahmud, 2022).

According to a study of a sample of university teachers in Jordan (Akour, Ala'a, Barakat, Kanj, Fakhouri, Malkawi et al., 2020), many found the move to e-learning an attractive challenge, but they were also concerned about issues such as the fairness and reliability of examinations and, in particular, the difficulties in separating work and personal time. Moreover, "59.2% of participants perceived that this teaching strategy led to intrusion of their privacy; that is, students would contact the teachers at any time of the day irrespective of private personal time (e.g., rest time and family time)" (Akour et al., 2020: page 2395).

This illustrates that, while ICT-based measures significantly favour access to university education, they also have negative effects resulting from intrinsic (personal) and contextual factors (Rodríguez-Vásquez, Totolhua-Reyes, Domínguez-Torres, Rojas-Solís & de-la-Rosa-Díaz, 2021).

Like millions of people worldwide, university teachers had to base the continuity of their work on the use of technology. Such a sudden change not only altered certain social and emotional aspects; other factors may have contributed to the rise of technostress, such as technological illiteracy, not having or not knowing how to use adequate ICT, insufficient connectivity, work overload aggravated by the invasion of private space (the resulting work–home convergence made self-organisation difficult), or the uncertainty of the context itself (Domínguez-Torres, Vega-Peña, Sierra-Barbosa & Pepín-Rubio, 2021).

In short, this sudden shift to online and hybrid learning models placed unforeseen demands on university professors. Because of this, when the need arose to explore the effects of technology on university faculty's performance and occupational health, some specific effects of technostress became evident (Rey-Merchán & López-Arquillos, 2022). In particular, higher levels of adverse effects on their mental health were demonstrated (Petrakova, Kanonire, Kulikova & Orel, 2021). Thus, to the professional pathologies that had traditionally affected teachers —such as *burnout* (Freudenberger, 1974; Malasch & Leiter, 2016) and voice disorders (Rey-Merchán & López-Arquillos, 2022)— tele-education added others related to high stress levels: depression, irritability, low job satisfaction, and even low self-esteem (Schonfeld, Bianchi & Luehring-Jones, 2017). Therefore, the COVID-19 pandemic process increased the levels of technostress and its consequences on university teachers (Arslan, Şahin, Ferhan-Odabaşı & Okur, 2022).

1.1. Aim and Research Questions

This systematic literature review pursues a dual general aim: to establish the relationships between technostress and mental health and to examine the relationship between technostress and its creators or

inhibitors among university faculty. To operationalize this aim and structure the evidence synthesis, the review is guided by the following research questions (RQs):

RQ1. What mental health outcomes and psychosocial risk factors are most consistently associated with technostress among university faculty?

RQ2. Which technostress creators and inhibitors are most frequently examined in higher education, and how are they conceptualized and operationalized?

RQ3. How do organizational and contextual conditions—including COVID-19-related transformations—moderate the relationship between technostress and mental health?

RQ4. What gaps and underexplored determinants remain in the literature, particularly regarding digital literacy, non-teaching technology demands, and ongoing technological updating?

RQ5. What theoretical and methodological limitations characterize current research on technostress among university faculty, and what measurement updates are needed to capture both distress and eustress dynamics?

2. Conceptual Approach to Technostress

In today's digital age, the concept of technostress has emerged as a critical phenomenon affecting both mental health in general and work performance in particular. Since the global confinement recommended by the WHO, institutions at all levels of education were forced to migrate, if they could, to online learning (Nang et al., 2022). This imposed a permanent and forced use of technologies.

Technostress is generally defined as stress associated with the use of ICT, and its impact has been a subject of growing interest in academic research (Ragu-Nathan, Tarafdar, Ragu-Nathan & Tu, 2008). Technostress manifests in various ways, including information overload, lack of time due to constant connectivity, and pressure to maintain high performance in highly digitalized environments (Ayyagari, Grover & Purvis, 2011). Rey-Merchán and López-Arquillos (2022) report that technostress has been associated for decades with physical conditions resulting from the inability to integrate the use of ICT in a healthy manner (Brod, 1987; Shaukat, Bendixen & Ayub, 2022). This association explains the importance attributed to ergonomics in terms of occupational health and safety. Other authors link technostress to any conditions arising from the use of technology —both physical and psychological; for example, behavioural alterations caused by constant exposure to technology (Rey-Merchán & López-Arquillos, 2022). Moreover, technostress has also been linked in particular to the excessive use of smartphones (Extremera, Quintana-Orts, Sánchez-Álvarez & Rey, 2019), which were included in the educational process as a means of connection.

Other lines of research on technostress have focused on examining both the factors that cause it —referred to as creators or stressors— and those that reduce its degree of impact and consequences— known as inhibitors (Rohwer, Flöther, Harth & Mache, 2022). Some studies have also specifically addressed the impact of technology on mental health (Dragano, Riedel-Heller & Lunau, 2021), emphasizing the development and validation of instruments to measure it. Others have focused on analysing the specific characteristics of hybrid environments and the complexity of cognitive and emotional demands (Daud, 2025).

Technostress has also been studied in relation to possible causal links between organizational work structures and productivity levels (Tarafdar, Pullins & Ragu-Nathan, 2015). However, research aimed at preventing or addressing the adverse effects of technostress remains scarce (Rohwer et al., 2022). Some research has also analysed the negative impact of technostress on job satisfaction and institutional commitment, an impact that occurs indirectly through the deterioration of teachers' psychological well-being (Tu, Rao, Jiang & Dai,, 2025). Organizational improvements and accessible, effective technical support are significantly associated with lower levels of technostress and a greater perception of ease in using technologies (Gabbiadini, Paganin & Simbula, 2023). Along the same lines, Zhang, Guo, Yuan and Ji (2025) argue that the effects of technostress do not occur in isolation, but are significantly associated with

organizational factors such as institutional support or corporate digital responsibility. These, in turn, inhibit the negative impact of technostress.

3. Methodology

This systematic literature review followed the PRISMA 2020 framework. It analysed the relationship between exposure to technostress and its effects on the mental health of university teaching staff. The literature search was conducted between January and March 2024 across five databases: Web of Science, Scopus, SciELO, ProQuest Education, and ProQuest Psychology. The search equation used was: [technostress OR tecnoestrés AND teacher*]. No language or publication date restrictions were applied.

To ensure the comprehensiveness of the search, the selection process was complemented with manual searches of secondary references within the primary results.

To assess the risk of bias in the included studies, the Newcastle–Ottawa Scale (NOS) (Wells et al. n.d.) adapted for cross-sectional studies was used (Herzog, Álvarez-Pasquin, Díaz, Del-Barrio, Estrada & Gil, 2013). This assessment tool assigns a score from 0 to 10 stars across three dimensions: selection (up to 4 stars), comparability (up to 2), and outcome (up to 4). In this case, scores of 7 to 10 indicate low risk of bias, 4 to 6 indicate moderate risk, and 0 to 3 indicate high risk.

3.1. Eligibility Criteria

The PICO framework—commonly used in health-related studies—was employed to establish the eligibility criteria. The target population (P) was active university teaching staff. The exposure of interest (I) was the use of digital technologies in the professional tasks associated with academic teaching and related responsibilities, while the comparator (C) included staff teaching in traditional face-to-face settings without significant technological integration. Eligible studies could be either quantitative and/or qualitative and had to be double-peer-reviewed. The object of study had to be primarily technostress, reporting at least one of the following outcome variables (O): the correlation between technostress and mental health, or the identification of technostress creators and/or inhibitors in university faculty.

3.2. Screening Results

The process of identifying, refining, and selecting studies followed the PRISMA 2020 flowchart (Page, McKenzie, Bossuyt, Boutron, Hoffmann, Mulrow et al., 2021). A total of 219 records were identified from the five databases. After removing 49 duplicates, 170 articles were screened by title and abstract. Seventeen articles were selected for full-text review, of which two were excluded for not meeting the inclusion criteria. The final analysis included 15 studies (Table 1).

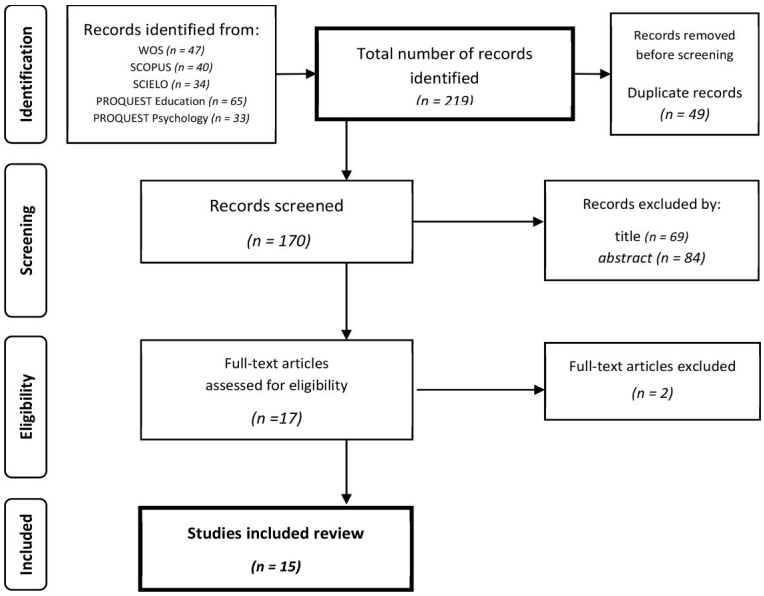
Screening stage	Number of studies
Records identified	219
Duplicates removed	49
Records after screeningRecords after screening	170
Full-text articles reviewed	17
Studies included in reviewStudies included in review	15

Note. Screening refers to the exclusion of duplicates and irrelevant articles based on title and abstract review. The screening procedure followed the PRISMA 2020 statement (Page et al., 2021).

Table 1. Screening results after following the PRISMA 2020 workflow (Page et al., 2021)

The selected studies focused on two main lines of analysis: (1) the correlation between technostress and mental health—addressing categories such as burnout, depression, fatigue, and anxiety (74% of the studies); and (2) the relationship between technostress and its creators/inhibitors (26%). Among the creators, the most frequent subcategories were techno-invasion, techno-overload, addiction, and work

overload. As for inhibitors, common subcategories included ease of use, social influence, adaptation, and ethics. The resulting PRISMA flow diagram is presented on Figure 1.



Note. The figure was created by the authors based on the PRISMA 2020 workflow (Page et al., 2021).

Figure 1. Sequence of procedures applied in systematic review and meta-analysis of technostress in university faculties

3.3. Risk of Bias and Methodological Quality Assessment

As previously indicated, the Newcastle-Ottawa Scale (NOS) was applied to assess the methodological quality and risk of bias of the analysed studies. In this case, the rating scale ranges from 0 to 10 points, with 10 being the highest score, indicating a high level of quality (i.e., low risk of bias). The scores awarded ranged from 5 to 9 (Mdn = 7.3), with four studies showing moderate risk of bias and eleven indicating low risk. The highest score (NOS = 9) corresponded to a study based on representative data from Jordan. A score of 8 was assigned to seven studies conducted in Mexico, the United States, the United Arab Emirates, and Ecuador-Spain. Three studies received a score of 7 and were conducted in populations from Spain, Japan, and Russia, respectively.

60% of the studies used previously validated measurement scales, while 40% employed self-report questionnaires to examine technostress exposure and other outcomes. Of the 15 studies included, 7% used probabilistic sampling, while 92.31% relied on non-probabilistic samples. None of the studies (100%) reported a response rate. Furthermore, 93.33% of the studies accounted for at least two confounding factors, while 6.66% did not account for any. Figure 2 presents the results.

The results were classified according to the study categories and the application of the Newcastle-Ottawa Scale (NOS). The first classification analysed the studies addressing the relationship between technostress and mental health, comprising 9 studies—of which 7 (78%) were rated as having low risk of bias and 2 (22%) as having moderate risk. Among these, 3 studies (33%) focused on the relationship between burnout and work engagement, 2 studies (22%) on mental health and workload, and 4 studies (44%) on technostress in relation to fatigue, anxiety, and depression. The results are presented in Table 2.

As for the technostress/creators-inhibitors category, six studies were assessed using the Newcastle-Ottawa Scale (NOS). Of these, 5 studies (83%) were rated as having low risk of bias, and 1 study (17%) as having moderate risk. Among these, 2 studies (33%) focused on the relationship between burnout and work

engagement, 1 study (17%) on mental health and workload, and 3 studies (50%) on technostress in relation to fatigue, anxiety, and depression. The findings are summarized in Table 3.

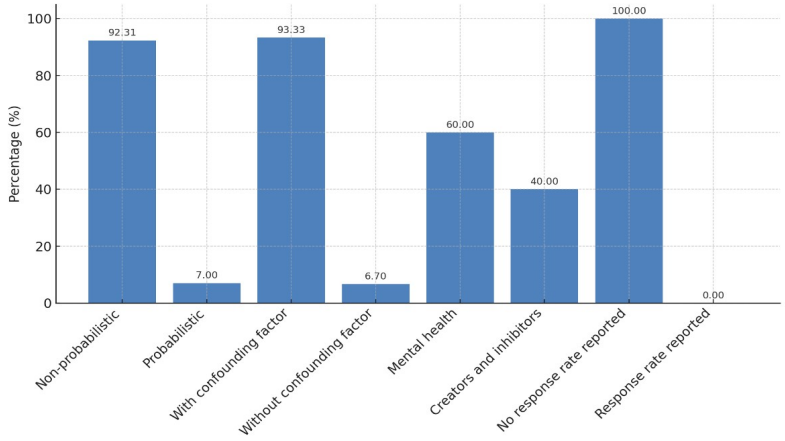


Figure 2. Analysis of quality factors that determine bias risk level according to the Newcastle-Ottawa Scale (NOS) (Wells, Shea, O'Connell, Peterson, Welch, Losos et al., n.d.)

Authors	Year	Confounding factors	Contributions / Identified conditions	NOS
Casacchia, Cifone, Giusti, Fabiani, Gatto, Lancia et al.	2021	gender, age, work experience, work modality, academic rank	Detection of significant alterations in sleep patterns and loss of energy. More impact on women than men. Evidence of depressive symptoms. Impact observed due to technical, pedagogical, and psychological challenges in distance education	6
Akour et al.	2020	age, sex, marital status, smoking status, region of residence, type of HEI, academic classification, teaching experience	Identification of distress and challenges caused by online education	9
Navarro-Espinosa, Vaquero-Abellán, Perea-Moreno, Pedrós-Pérez, Aparicio-Martínez & Martínez-Jiménez	2021	age, gender, teaching experience, educational level, ICT competencies	High levels of anxiety and depression linked to increased risk of mental health disorders	8
Kita, Yasuda & Gherghel	2022	age, gender, years of teaching experience	Relationship between mental health deterioration during COVID-19 and workload	7
Cacciamani, Cesareni, Fiorilli & Ligorio	2022	age, gender, years of teaching experience	Relationship between technology use/burnout and work engagement	8
Alzahmi, Belbase & Al-Hosani	2022	gender, age, academic rank, teaching experience	Relationship between perceived burnout and technology use	8
Răducu & Stănculescu	2022	gender, age, teaching experience	Identification of different psychological resources and burnout risk profiles	6
Goebel & Carlotto	n/a	gender, age, academic level, contractual status	Relationship between excessive working hours and health problems	7
García-González, Torrano & García-González	2020	gender, age, years of teaching experience, academic level	Recommendations include training programs, ergonomic adjustments, and facilitation of social contact	8

Note. Main findings of the studies addressing the relationship between technostress and mental health in university teaching staff. Confounding factors were identified based on the Newcastle-Ottawa Scale (NOS) assessment. NOS scores range from 0 to 10, with higher scores indicating lower risk of bias.

Table 2. Assessment of studies using the Newcastle-Ottawa Scale (NOS)

Authors	Year	Confounding factors	Contributions / Identified conditions	NOS
Rodríguez-Vásquez et al.	2021	gender, age, type of institution, work modality, teaching experience, academic level	Significant differences in technostress levels by gender. Higher prevalence in female faculty. Technostress positively associated with work-family conflict.	8
Boyer-Davis & Berry	2022	age, gender, teaching experience, academic level	Findings focused on reduction in technostress levels through adaptation, and a decrease in perceptions of computer anxiety.	8
Mäkelä, Sikström, Jääskelä, Korkala, Kotkajuuri, Kaski & Taalas	2022	gender, age, teaching experience	Explores factors that restrict teachers' well-being and agency, which in turn affect their teaching capacity at the university level.	6
Domínguez-Torres, Rodríguez-Vásquez, Totolhua-Reyes & Rojas-Solís	2021	gender, teaching experience, workplace category, academic level	Identification of key technostress creators: techno-overload, daily work intensity, techno-invasion, and socio-emotional consequences of working beyond regular hours. Inhibitors seem not to have protective effect.	8
Goldemberg-Vargas, Araya, Alfaro-Pérez & Salazar-Concha	2022	None	Excessive after-hours workload caused fatigue and mental and cognitive exhaustion. Reported issues: sleep disturbances, headaches, muscle and back pain, and stomach disorders. Inhibitors: managerial support and faculty training in digital tools.	5
Petrakova et al.	2021	gender, age, teaching experience	Faculty stress increased due to lack of administrative support and a substantial increase in workload associated with the transition to distance education and the development of new teaching strategies.	7

Table 3. Studies addressing the relationship between technostress and its creators and inhibitors in university teaching staff

Regarding the methodology applied in the studies within the technostress/mental health category, 8 studies (89%) used a quantitative approach and 1 study (11%) applied a mixed-methods design. No studies employed a qualitative methodology. The most commonly used instruments for data collection were: the Beck Depression Inventory-II (BDI-II), the Kessler Psychological Distress Scale (K10), the WHO-5 Well-Being Index, Rosenberg's subscales for anxiety and depression risk, and the Technostress Scale (RED/TIC). Table 4 presents the summary.

The second classification focused on studies examining the relationship between technostress and its creators and inhibitors, which included 6 studies. Of these, 4 studies (67%) presented a low risk of bias, while the remaining 2 (33%) showed a moderate risk. The most prominent factors identified as technostress creators were work overload, time management, technology use, and the transition to virtual education. As for the inhibitors, the most frequently cited included technological proficiency and control, leadership support, psychological support, and social support. The summary is shown in Table 5.

Authors	Year	Sample size	Method	Instrument	Country
Casacchia et al.	2021	97	Quant.	Beck Depression Inventory-II (BDI-II); anonymous cross-sectional survey	Italy
Akour et al.	2020	372	Quant.	Online survey; Kessler Psychological Distress Scale (K10)	Jordan
Navarro-Espinosa et al.	2021	55	Mixed	Rosenberg subscales for anxiety and depression risk	Ecuador-Spain
Kita et al.	2022	537	Quant.	WHO-5 Well-Being Index	Japan
Cacciamani et al.	2022	358	Quant.	Utrecht Work Engagement Scale	Italy
Alzahmi et al.	2022	101	Quant.	Self-constructed online questionnaire	Kuwait and the United Arab Emirates
Răducu & Stănculescu	2022	330	Quant.	Online survey; data collected via Google Forms in spring 2021	Romania
Goebel & Carlotto	n/a	126	Quant.	Technostress Scale (RED/TIC) by Salanova et al. (2007), adapted for use in Brazil by Carlotto & Câmara (2010)	Brazil
García-González et al.	2020	14	Quant.	Questionnaire	Spain

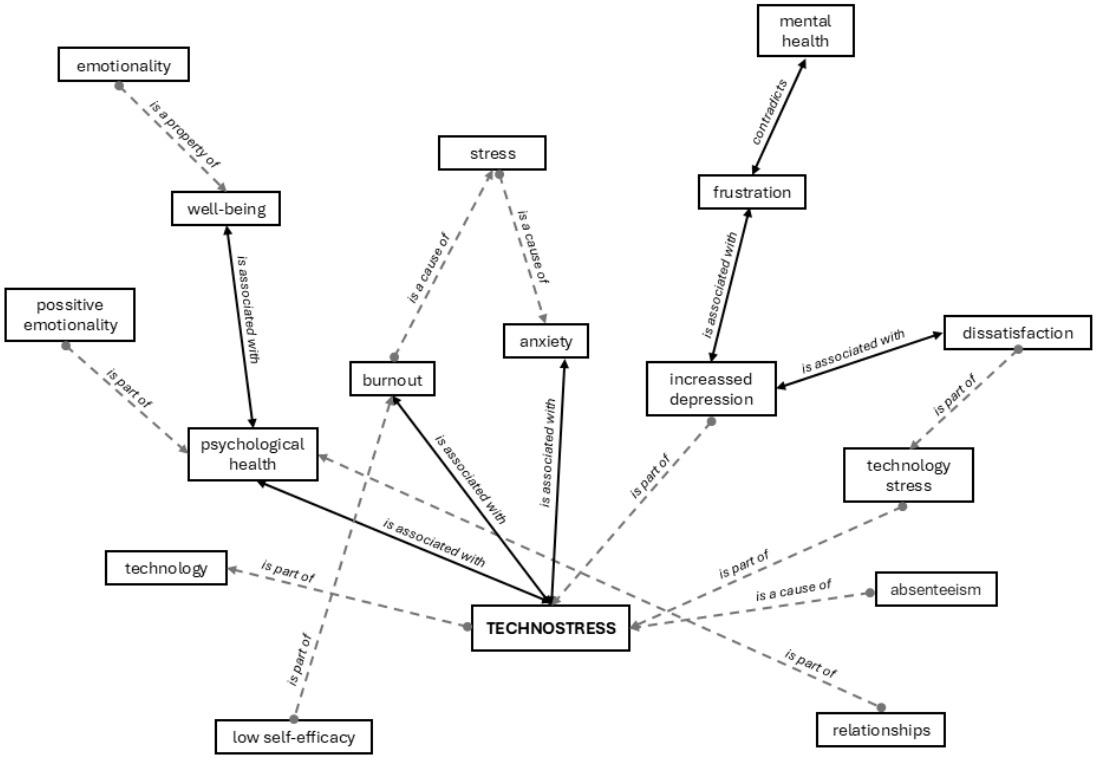
Table 4. Key methodological details of studies categorized under technostress and mental health

Authors	Year	Sample size	Method	Instrument	Country
Rodríguez-Vásquez et al.	2021	127	Quant.	Technostress Scale (Llorens et al., 2011); Questionnaire on technostress creators and inhibitors (Ragu-Nathan et al., 2008), modified version by Cuervo et al. (2020)	Mexico
Boyer-Davis & Berry	2022	307	Quant.	Technostress Scale (Tarafdar et al., 2007)	United States
Mäkelä et al.	2022	543	Quant.	Online survey	Finland
Domínguez-Torres, Rodríguez-Vásquez et al.	2021	60	Quant.	Exploring Technostress Questionnaire (Jonušauskas & Raišiene, 2016)	Mexico
Goldemberg-Vargas et al.	2022	81	Quant.	Online survey	n/a
Petrakova et al.	2021	14	Qual.	Semi-structured interview	Russia

Table 5. Key methodological details of studies categorized under technostress in relation to its creators and inhibitors

3.4. Semantic Relational Analysis

In addition, a content analysis was conducted on the documents retrieved from the various databases using Atlas.ti software, with the aim of identifying relationships between keywords related to technostress and generating the corresponding semantic network. Terms such as *anxiety*, *absenteeism*, *dissatisfaction*, and *frustration* appear in direct relation to technostress. Furthermore, terms such as *positive emotionality* and *well-being* show a direct connection to psychological health. Notably, the increase in *depression* is directly linked to *frustration* and *dissatisfaction*, the latter being associated with technostress through the more generic concept of *stress technology*. Although not unambiguously translatable into Spanish, this term is commonly rendered as *estrés tecnológico*. The resulting semantic cloud is shown in Figure 3.



Note. The links represent different types of relations: causal ("is a cause of"), associative ("is associated with"), inclusion ("is part of"), and opposition ("contradicts"). Solid lines indicate bidirectional relationships, while dashed lines represent unidirectional ones. Causal transitivity may be inferred in chains such as [A → B] and [B → C], suggesting that [A → C]; for example: [burnout causes stress] and [stress causes anxiety] implies that [burnout may cause anxiety].

Figure 3. Direct and indirect, uni- and bidirectional semantic relationships among the 16 keywords connected to technostress

4. Study Characteristics

42% of the studies were conducted with populations from the Americas, 31.6% with European populations, and 26.4% with Asian populations. Most studies used convenience sampling across various higher education institutions. In qualitative cohort studies, the population consisted of 14 faculty members, while quantitative studies included samples ranging from 60 to 3,000 university teaching staff. In most cases, neither age distribution nor gender proportions were balanced, with the latter varying according to the sampling configuration. That is, the overrepresentation of specific age or gender groups varied significantly across most studies.

5. Discussion

The main objective of this review was to establish the relationships between technostress and mental health, on the one hand, and between technostress and its creators or inhibitors, on the other. Regarding the first aspect, studies were identified that link technostress to conditions such as fatigue, depression, and anxiety. With respect to the second, the literature is predominantly focused on creators, with fatigue emerging as the most frequently studied factor in relation to both depression and anxiety.

With regard to inhibitors, the most frequently cited subcategories were ease of use, social influence, adaptation, and ethical considerations. The relationships established in the literature point to a decline in the physical and cognitive capacity of university faculty, as the demands of online workdays lead to overloads typically categorized as fatigue (Carrión-Bósquez, Castelo-Rivas, Guerrero-Pachacama, Criollo-Sarco & Jaramillo-Verduga, 2022). Psychosocial technostress-related factors—such as anxiety,

depression, and stress—emerged as predominant across the studies analysed (Estrada-Araoz & Gallegos, 2022).

Regarding the methods used in the studies, most employed quantitative techniques, often adapting *ad hoc* and validating pre-existing instruments. There were also cases in which surveys were used without undergoing psychometric or content validation, limiting the reliability of the research and its potential replicability in other contexts and populations.

The predominantly quantitative methodology could have been complemented by qualitative techniques. This would have enabled a closer engagement with the studied populations and enriched the understanding of technostress-related factors. It is advisable to contrast related studies through triangulation supported by interviews, observation, focus groups, or other qualitative procedures. This could help reduce research bias, thereby improving the accuracy and credibility of the findings.

When analysing the quality of the studies for inclusion in the review, the aim was to identify levels of bias in order to determine factors that tend to be overlooked in research on technostress. It was found that most of the studies do not report their response rates to the applied instruments—an essential piece of data if the goal is to generalize the findings beyond the specific populations studied in each case (Navas-Ara, Fidalgo-Aliste, Concepción, Suárez, Briozo-Díez, Gil-Escudero et al., 2012).

5.1. Answers to Research Questions

This systematic literature review provides relevant answers to the research questions posed in Section 1.1.

Regarding the first question—on the relationship between mental health and psychosocial factors—the analyzed articles gather evidence of a direct, consistent, and empirical relationship between technostress and mental health deterioration among university faculty. The most prevalent disorders include anxiety, fatigue, depression, emotional exhaustion, and sleep disturbances, which can be identified as the main psychosocial risk factors associated with prolonged exposure to technology. Furthermore, the studies identify fatigue as a mediating variable in the presence of anxiety-depressive symptoms, indicating that the cognitive overload caused by extended technological exposure constitutes a significant occupational health risk for university teaching staff.

In relation to the second question, on technostress creators and inhibitors, the results show that the reviewed studies focus primarily on technostress creators such as techno-overload, techno-invasion, work intensity, the blurring of boundaries between personal life and work, and contextual uncertainty. In contrast, less attention is given to the analysis of technostress inhibitors, which include technological training, digital competence, organizational and managerial support, social support, and psychological support. Furthermore, the studies indicate that these inhibitors function as protective factors only when they are integrated into structured and sustained institutional policies.

As for the third question, the studies confirm the moderating role of organizational and contextual conditions in the relationship between technostress and mental health. Additionally, the COVID-19 scenario amplified levels of technostress due to the perceived risk and uncertainty, as well as the emergency measures that had to be adopted without prior planning or preparation to implement remote teaching. The studies identified that the unregulated increase in workload, the lack of institutional support, and the limited digital readiness of teachers were factors associated with the intensification of the negative effects of technostress. These findings support the view that technostress is not merely an individual phenomenon but also a psychosocial risk of organizational and structural nature.

With respect to the fourth question—concerning the unexplored areas in the reviewed articles—the systematic review reveals significant gaps in the exploration of factors such as digital literacy and the ongoing technological updating required of university faculty, as well as technology-related demands associated with teaching practice, including digital assessment, administrative tasks, and academic

management across multiple platforms. These factors are underrepresented in the analytical models presented in the studies, which limits a comprehensive understanding of the phenomenon.

Concerning the fifth and final question—on the theoretical or methodological limitations of the studies and the potential need to update measurement approaches—the review identifies recurring limitations, such as the predominance of cross-sectional quantitative designs, the widespread use of non-probabilistic samples, and the lack of reporting on response rates. All of these factors limit the generalizability of the findings. For instance, non-probabilistic samples make it impossible to calculate margins of error or to consider the samples representative of the overall university faculty. This also increases the risk of generalization bias.

Moreover, it is observed that the measurement instruments focus solely on distress, highlighting the need that the research include technological eustress factors in order to identify the potential positive effects of the teacher–technology relationship.

Finally, the semantic analysis of the reviewed studies aims to present in a clear and systematic way the terminology used in technostress research, in order to provide future researchers with relevant keywords that facilitate the retrieval of studies from databases and repositories.

6. Limitations and Future Directions

This research requires to consider certain limitations when interpreting the results. The systematic review carried out is limited to indexed articles, and only those that underwent peer review were considered, excluding gray literature. Furthermore, due to the limited scientific output addressing this topic specifically in relation to university professors, the number of specific studies is limited. In addition, most were conducted during the COVID-19 pandemic, so any extrapolation should be based on analysis from the current context.

Therefore, future research should aim to address the methodological limitations identified in the reviewed studies. In particular, it is necessary to broaden the scope beyond indexed and peer-reviewed literature by incorporating grey literature and preprints, which may offer valuable complementary perspectives. It is also essential to conduct research in post-pandemic contexts in order to analyze whether the observed effects of technostress persist or have evolved in different educational settings.

In addition, based on the findings of this review, it would be advisable to develop a general guide of good practices aimed at preventing technostress among university teaching staff. This guide should integrate evidence-based recommendations on workload management, digital skills training, organizational support, and the responsible use of educational technologies. Such an initiative could help institutions create healthier digital work environments for their academic personnel.

Technostress prevention should be integrated into the broader framework of university social responsibility (USR), promoting a more sustainable academic culture that acknowledges and addresses the issue. Institutional communication strategies—particularly those related to staff well-being—should reflect this commitment through awareness-raising actions, stigma reduction, and the dissemination of resources to mitigate technostress throughout the university community.

As a complementary forward-looking line based on this review, it is also pertinent to promote the ethical and responsible use of artificial intelligence (AI) in higher education to help reduce the incidence of technostressors associated with both teaching activities and related administrative tasks. Such efforts should focus not only on process optimization but also on supporting the occupational well-being of academic staff. This requires critical AI literacy, enabling university teachers to understand its potential and limitations and to make informed decisions about its adoption in educational contexts.

This requires critical AI literacy, enabling university teachers to understand its potential and limitations and to make informed decisions about its adoption in educational contexts. In this regard, it is essential to consider the UNESCO competence frameworks on AI for teachers and students (Miao & Cukurova, 2024).

7. Conclusions

According to the studies analysed, there is a tendency not to explicitly state the theoretical perspective adopted to study technostress. However, they implicitly align with the definition of stress as "a nonspecific response of the organism to a variety of demands" (Sierra, Ortega & Zubeidat, 2003: page 37 [translated from Spanish]). Technostress is thus presented as a response to demands of technological origin.

The reviewed studies, categorized under both categories—technostress/mental health and technostress/creators-inhibitors—examine technostress from the field of psychology and primarily focus on identifying possible creators and inhibitors of the phenomenon.

Regarding empirical findings and their consequences, the studies analysed reveal direct relationships between technostress and mental health conditions considered psychosocial risk factors, such as fatigue, anxiety, and exhaustion. Research on technostress should promote the analysis and measurement of these risk factors.

Notably, some of the reviewed studies were conducted during the COVID-19 pandemic, reflecting the growing interest in examining the direct relationship between technostressors and mental health. These studies also highlighted the urgent need for psychological support to improve university faculty's adaptation to online education. Other studies emphasized the importance of implementing preventive actions such as occupational health training and time management.

However, among the least studied factors are digital literacy and the ongoing technological updating that university faculty must undergo to perform tasks unrelated to teaching.

As for the results in the category of technostress creators and inhibitors, techno-overload, techno-invasion, and contextual uncertainty stand out as the most frequently analysed motivating factors, while the most prominent inhibitors include technological proficiency—ICT competencies to reduce over-demand and increase performance—leadership support, psychological support, and social support.

It is important to further investigate, on the one hand, the processes that allow for the identification of additional technostressors in the academic context—for example, by examining the role of ergonomic adaptation as a potential inhibitor. On the other hand, research should also explore the potentially positive dynamics of the teacher-technology relationship when supported by favourable organizational conditions acting as inhibitors.

This systematic literature review also allows for the extraction of methodological conclusions and projections for future research. With regard to the measurement instruments used, an update of the technostress creators and inhibitors—as well as of the scales employed to assess their presence and impact—would be advisable. Likewise, the potential positive effects of technostress appear to be overlooked, which calls for further exploration of technostress among university faculty not only in relation to its negative manifestations, but also considering those that may prove beneficial: so-called *distress* and *eustress*, respectively (Selye, 1976). In this regard, the systematic literature review conducted by Saavedra (2022) on both concepts will serve as a valuable reference.

Declaration of Conflicting Interests

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

References

Akour, A., Ala'a, B., Barakat, M., Kanj, R., Fakhouri, H.N., Malkawi, A. et al. (2020). The impact of the COVID-19 pandemic and emergency distance teaching on the psychological status of university teachers: a cross-sectional study in Jordan. *The American journal of tropical medicine and hygiene*, 103(6), 2391-2399. https://doi.org/10.4269/ajtmh.20-0877

Alzahmi, E. A., Belbase, S., & Al Hosani, M. (2022). Teacher burnout and collegiality at the workplace in Higher Education Institutions in the Arab Gulf Region. *Education Sciences,* 12(10), 718. https://doi.org/10.3390/educsci12100718

Arslan, H., Şahin, Y.L., Ferhan-Odabaşı, H., & Okur, M.R. (2022). An investigation of change in teachers' technostress levels before and after the Covid-19 outbreak. *Educational Media International,* 59(2), 95-111. https://doi.org/10.1080/09523987.2022.2101202

Ayyagari, R., Grover, V., & Purvis, R. (2011). Technostress: Technological antecedents and implications. *MIS quarterly*, 35(4), 831-858. https://doi.org/10.2307/41409963

Boyer-Davis, S., & Berry, K. (2022). Technostress Creators in Higher Education During the Covid-19 Pandemic: A Comparison of Faculty Perceptions and Experiences. *Journal of Higher Education Theory & Practice*, 22(10). https://doi.org/10.33423/jhetp.v22i10.5383

Brod, C. (1987) Managing technostress: Optimizing the use of computer technology. *Personnel Journal,* 61, 753-757.

Cacciamani, S., Cesareni, D., Fiorilli, C., & Ligorio, M. B. (2022). Teachers' work engagement, burnout, and interest toward ICT training: School level differences. *Education Sciences,* 12(7), 493. https://doi.org/10.3390/educsci12070493

Carrión-Bósquez, N.G., Castelo-Rivas, W.P., Guerrero-Pachacama, J.A., Criollo-Sarco, L.V., & Jaramillo-Verduga, M.J. (2022). Factores que influyen en el tecnoestrés docente durante la pandemia por la COVID-19, Ecuador [Factors influencing teacher technostress during the COVID-19 pandemic in Ecuador]. *Revista Información Científica*, 101(2). Available at: https://revinfcientifica.sld.cu/index.php/ric/article/view/3778

Casacchia, M., Cifone, M. G., Giusti, L., Fabiani, L., Gatto, R., Lancia, L. & Roncone, R. (2021). Distance education during COVID 19: an Italian survey on the university teachers' perspectives and their emotional conditions. *BMC Medical Education,* 21(1), 335. https://doi.org/10.1186/s12909-021-02780-y

Daud, N.M. (2025). From innovation to stress: analyzing hybrid technology adoption and its role in technostress among students. *International Journal of Educational Technology in Higher Education,* 22(1), 31. https://doi.org/10.1186/s41239-025-00529-x

Domínguez-Torres, L., Rodríguez-Vásquez, D. J., Totolhua-Reyes, B. A., & Rojas-Solís, J. L. (2021). Tecnoestrés en docentes de educación media superior en el contexto de confinamiento por COVID-19: Un estudio exploratorio. *Dilemas contemporáneos: educación, política y valores,* 9(SPE1). https://doi.org/10.46377/dilemas.v9i.2950

Domínguez-Torres, L.C., Vega-Peña, N.V., Sierra-Barbosa, D.O., & Pepín-Rubio, J.J. (2021). Aula invertida a distancia vs. aula invertida convencional: un estudio comparativo [Remote flipped classroom vs. traditional flipped classroom: A comparative study]. *Iatreia*, 34(3), 260-265.

Dragano, N., Riedel-Heller, S.G., & Lunau, T. (2021). Haben digitale Technologien bei der Arbeit Einfluss auf die psychische Gesundheit? [Do digital technologies at work impact mental health of employees?] *Der Nervenarzt*, 1-7. https://doi.org/10.1007/s00115-021-01192-z

Estrada-Araoz, G., & Gallegos, A. (2022). Tecnoestrés en el contexto educativo: Un problema emergente durante la pandemia COVID-19 [Technostress in the educational context: An emerging problem during the COVID-19 pandemic]. *Apuntes Universitarios*, 12(1), 447-451. https://doi.org/10.17162/au.v12i1.992

Estrada-Muñoz, C., Castillo, D., Vega-Muñoz, A., & Boada-Grau, J. (2020). Teacher technostress in the Chilean school system. *International Journal of Environmental Research and Public Health*, 17(15), 2-17. https://doi.org/10.3390/ijerph17155280

Extremera, N., Quintana-Orts, C., Sánchez-Álvarez, N., & Rey, L. (2019). The Role of Cognitive Emotion Regulation Strategies on Problematic Smartphone Use: Comparison between Problematic and Non-Problematic Adolescent Users. *International Journal of Environmental Research and Public Health*, 16(17), 3142. https://doi.org/10.3390/ijerph16173142

Freudenberger, H.J. (1974). Staff burn-out. *Journal of Social Issues,* 30(1), 159-165. https://doi.org/10.1111/j.1540-4560.1974.tb00706.x

Gabbiadini, A., Paganin, G., & Simbula, S. (2023). Teaching after the pandemic: The role of technostress and organizational support on intentions to adopt remote teaching technologies. *Acta Psychologica,* 236, 103936. https://doi.org/10.1016/j.actpsy.2023.103936

García-González, M. A., Torrano, F., & García-González, G. (2020). Analysis of stress factors for female professors at online universities. *International Journal of Environmental Research and Public Health,* 17(8), 2958. https://doi.org/10.3390/ijerph17082958

Goebel, D. K., & Carlotto, M. S. (2019). Preditores do tecnoestresse em professores de EaD. R*evista Tecnologia e Sociedade,* 15(38). https://doi.org/10.3895/rts.v15n38.8475

Goldemberg-Vargas, A., Araya-Guzmán, S., Alfaro-Pérez, J., & Salazar-Concha, C. (2022, June). Explorando factores que inciden en la fatiga tecnológica (tecnofatiga) de docentes universitarios. In *2022 17th Iberian Conference on Information Systems and Technologies (CISTI)* (pp. 1-4). IEEE. https://doi.org/10.23919/CISTI54924.2022.9820190

Herzog, R., Álvarez-Pasquin, M.J., Díaz, C., Del-Barrio, J.L., Estrada, J.M., & Gil, Á. (2013). Is healthcare workers' intention to vaccinate related to their knowledge, beliefs and attitudes? A systematic review. *BMC Public Health*, 13, 154. https://doi.org/10.1186/1471-2458-13-154

Kita, Y., Yasuda, S., & Gherghel, C. (2022). Online education and the mental health of faculty during the COVID-19 pandemic in Japan. *Scientific reports,* 12(1), 8990. https://doi.org/10.1038/s41598-022-12841-x

Losada, A.V., & Lanuque, A. (2021). Tecnoestrés en ambientes universitarios y su impacto en la ansiedad adolescente [Technostress in university environments and its impact on adolescent anxiety]. *Actualidad Psicológica,* 507, 7-10.

Mäkelä, T., Sikström, P., Jääskelä, P., Korkala, S., Kotkajuuri, J., Kaski, S., & Taalas, P. (2022). Factors constraining teachers' wellbeing and agency in a Finnish university: Lessons from the COVID-19 pandemic. *Education Sciences,* 12(10), 722. https://doi.org/10.3390/educsci12100722

Maslach, C., & Leiter, M.P. (2016). Understanding the burnout experience: Recent research and its implications for psychiatry. *World Psychiatry,* 15(2), 103-111. https://doi.org/10.1002/wps.20311

Miao, F., & Cukurova, M. (2024). *AI competency framework for teachers.* UNESCO. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000391104

Moreno-Guerrero, A.J., Gómez-García, G., López-Belmonte, J., & Rodríguez-Jiménez, C. (2020). Internet addiction in the Web of Science database: a review of the literature with scientific mapping. *International journal of environmental research and public health*, 17(8), 2-16. https://doi.org/10.3390/ijerph17082753

Nang, A.F.M., Maat, S.M., & Mahmud, M.S. (2022). Teacher technostress and coping mechanisms during Covid-19 pandemic: A systematic review. *Pegem Journal of Education and instruction*, 12(2), 200-212. https://doi.org/10.47750/pegegog.12.02.20

Navarro-Espinosa, J.A.;Vaquero-Abellán, M.; Perea-Moreno, A.-J.; Pedrós-Pérez, G.; Aparicio-Martínez, P.; Martínez-Jiménez, M.P. (2021).The Influence of Technology on MentalWell-Being of STEM Teachers at University Level: COVID-19 as a Stressor. *Int. J. Environ. Res. Public Health,* 18, 9605. https://doi.org/10.3390/ijerph18189605

Navas-Ara, M.J., Fidalgo-Aliste, A.M., Concepción, G.E., Suárez, F.J.C., Briozo-Díez, A., Gil-Escudero et al. (2012). *Métodos, diseños y técnicas de investigación psicológica* [Methods, designs, and techniques in psychological research]. UNED.

Orlikowski, W.J., & Iacono, C.S. (2001). Research commentary: Desperately seeking the "IT" in IT research—A call to theorizing the IT artifact. *Information systems research*, 12(2), 121-134. https://doi.org/10.1287/isre.12.2.121.9700

Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D. et al. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ,* 372(71). https://doi.org/10.1136/bmj.n71

Petrakova, A., Kanonire, T., Kulikova, A., & Orel, E. (2021). Characteristics of teacher stress during distance learning imposed by the COVID-19 pandemic. *Voprosy Obrazovaniya / Educational Studies Moscow,* 2021(1), 93-114. https://doi.org/10.17323/1814-9545-2021-1-93-114

Răducu, C.M., & Stănculescu, E. (2022). Personality and socio-demographic variables in teacher burnout during the COVID-19 pandemic: A latent profile analysis. *Scientific Reports,* 12, 14272. https://doi.org/10.1038/s41598-022-18581-2

Ragu-Nathan, T.S., Tarafdar, M., Ragu-Nathan, B.S., & Tu, Q. (2008). The consequences of technostress for end users in organizations: Conceptual development and empirical validation. *Information Systems Research*, 19(4), 417-433. https://doi.org/10.1287/isre.1070.0165

Rey-Merchán, M.D.C., & López-Arquillos, A. (2022). Occupational risk of technostress related to the use of ICT among teachers in Spain. *Sustainability*, 14(14), 8746. https://doi.org/10.3390/su14148746

Rodríguez-Vásquez, D.J., Totolhua-Reyes, B.A., Domínguez-Torres, L., Rojas-Solís, J.L., & de-la-Rosa-Díaz, B.E. (2021). Tecnoestrés: Un análisis descriptivo en docentes universitarios durante la contingencia sanitaria por COVID-19 [Technostress: An descriptive analysis in university faculty during the COVID-19 health emergency]. *Enseñanza en Investigación en Psicología,* 3(2), 225-237. Available at: https://revistacneipne.org/index.php/cneip/article/view/122

Rohwer, E., Flöther, J.C., Harth, V., & Mache, S. (2022). Overcoming the "dark side" of technology: A scoping review on preventing and coping with work-related technostress. *International Journal of Environmental Research and Public Health,* 19, 3625. https://doi.org/10.3390/ijerph19063625

Saavedra, C. (2022). Eustrés y distrés: Revisión sistemática de la literatura [Eustress and distress: A systematic literature review]. *Cuadernos Hispanoamericanos de Psicología,* 22(2), 1-17. https://doi.org/10.18270/chps..v22i2.4415

Schonfeld, I.S., Bianchi, R., & Luehring-Jones, P. (2017). Consequences of job stress for the mental health of teachers. In Schonfeld, I.S., & Bianchi, R. (Eds.), *Educator stress: An occupational health perspective* (55-75). Springer.

Seyle, H. (1976). *Stress in Health and Disease*. Butterworths.

Shaukat, S., Bendixen, L.D., & Ayub, N. (2022). The Impact of Technostress on Teacher Educators' Work-Family Conflict and Life Satisfaction While Working Remotely during COVID-19 in Pakistan Education Sciences, 12(616) 2-11. https://doi.org/10.3390/educsci12090616

Sierra, J.C., Ortega, V., & Zubeidat, I. (2003). Ansiedad, angustia y estrés: tres conceptos a diferenciar [Anxiety, anguish, and stress: Three concepts to differentiate]. *Revista Mal-Estar e Subjetividade*, 3(1), 10-59. Available at: https://www.redalyc.org/articulo.oa?id=27130102

Sumba-Nacipucha, N., Cueva-Estrada, J.M., Conde-Lorenzo, E., & Mármol-Castillo, M. (2020). Higher Education in Ecuador in Times of COVID 19 within the framework of the TPACK Model. *Revista San Gregorio*, 43, 171-186. Available at: https://revista.sangregorio.edu.ec/index.php/REVISTASANGREGORIO/article/view/1524

Tacy, J.W. (2016). Technostress: A concept analysis. *On-Line Journal of Nursing Informatics*, 20(2). Available at: https://ojni.org/OJNI-V20-N2.pdf

Tarafdar, M., Pullins, E.B., & Ragu-Nathan, T.S. (2015). Technostress: negative effect on performance and possible mitigations. *Information Systems Journal*, 25(2), 103-132. https://doi.org/10.1111/isj.12042

Tu, L., Rao, Z., Jiang, H., & Dai, L. (2025). Technostress, burnout, and job satisfaction: An empirical study of STEM teachers' well-being and performance. *Behavioral Sciences,* 15(7), 992. Available at: https://www.mdpi.com/2076-328X/15/7/992

Wells, G.A., Shea, B., O'Connell, D., Peterson, J., Welch, V., Losos, M. et al. (n.d.). *The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomized studies in meta-analyses*. Ottawa Hospital Research Institute. Available at: https://www.ohri.ca/programs/clinical_epidemiology/oxford.asp

Zhang, S., Guo, P., Yuan, Y., & Ji, Y. (2025). Anxiety or engaged? Research on the impact of technostress on employees' innovative behavior in the era of artificial intelligence. *Acta Psychologica*, 259, 105442. Available at: https://www.sciencedirect.com/science/article/pii/S0001691825007553

Published by OmniaScience (www.omniascience.com)

Journal of Technology and Science Education, 2026 (www.jotse.org)