

Technostress, equity, and institutional management in open and distance learning: A bibliometric analysis

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Abstract

Open and distance learning (ODL) institutions built their case on a promise of access, using technology to reach learners that conventional systems could not. Yet for many learners in low-resource settings, that same technology becomes a source of psychological strain that institutions manage poorly, if at all. This paper treats technostress in ODL as an institutional management problem, not only an individual or purely educational one, and argues that the field has not adequately recognised it as an equity and organisational-design concern. A bibliometric analysis of 347 Scopus-indexed peer-reviewed articles published between 2018 and 2026 shows that technostress research and ODL equity research have developed largely in parallel, covering overlapping ground while rarely informing institutional practice or management theory. To close this gap, the paper proposes the Equity-Centred Technostress Framework (ECTF), a management tool grounded in Conservation of Resources theory (Hobfoll, 1989) and Digital Equity theory (van Dijk, 2005). This is not an established model but a propositional framework, setting out four concepts for empirical testing that require primary validation. For ODL institutions and the managers who run them, it offers a shared vocabulary connecting equity concerns to technostress, and gives concrete direction for management decisions in enrolment screening, platform procurement, and completion monitoring.

Keywords: Technostress, Digital Equity, Digital Divide, Institutional Management, Human Capital, ODL, Bibliometric Analysis

JEL Classification: M10, M12, I24

1. Introduction

ODL institutions operate, in effect, as large-scale service organisations: like any organisation that manages a dispersed workforce or customer base through technology, they depend on digital systems to reach the populations they serve, and they carry the management responsibility that comes with that dependence. ODL was built on a promise: to reach learners that no other system could reach. National education systems in sub-Saharan Africa, South Asia and the Pacific have all made such promises (Olakulehin & Ojo, 2013; Siaciwena & Lubinda, 2008). Millions of students gained access to devices and internet connectivity, yet many were still unable to make full use of that access. Often, the technology itself was the problem. How institutions manage that technology is the central concern of this paper. Prior work in journals focused on learning and development has reported on barriers to ICT access (Balasubramanian et al., 2009), gaps in learner support (Kanwar & Sanjeeva, 2022), and questions of digital inclusion (Birdsall, 2021). What the field has largely overlooked is what the technology itself produces: psychological stress (Tarafdar et al., 2007). Organisational research has identified five dimensions of this stress: techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty (Ragu-Nathan et al., 2008). In ODL, all five appear in everyday learner situations – sharing one phone among three family members, navigating a confusing learning platform on a 2G connection, or losing internet access during a crucial test. These are not matters of minor inconvenience; they are stressors, and stressors reduce attention and motivation and push learners towards dropping out. Two readings of this stress need separating. As a psychological construct, technostress is the strain an individual feels when technology demands more than they can handle, and most of the literature measures it at that level. As an institutional management issue, it is a condition that organisations produce or reduce through the platforms they choose, the support they offer and what they decide to track. This paper is concerned with the second reading, although it relies on the first for its concepts and measures.

The deeper problem is not that these conditions exist, but that institutions do not measure them. A bibliometric analysis of 347 Scopus-indexed documents suggests that technostress researchers and equity researchers are studying the same learner populations with little sign of reading each other's work. Of 74 equity and digital-divide papers in the corpus, very few use technostress as an analytical tool at all. This paper makes three contributions, each with a management orientation. First, it uses bibliometric evidence to show that the gap between technostress and equity research is consistent across five independent analyses. This is not an oversight in any single study; it may reflect something more structural in how the field, and the institutions it studies, have organised their questions and their management practice. Second, it proposes the ECTF as a propositional framework for future empirical work and as a practical management tool. The framework does not derive from the bibliometric findings; it is built on the small but growing body of primary empirical studies reviewed in Section 2, together with organisational-behaviour theory on resource-based stress, and it requires primary validation before causal claims can be drawn from it. Third, it gives

institutional managers concrete guidance on what to change, from how they screen learners at enrolment – a task with clear parallels to workforce screening and human-resource intake processes – to how they set platform-procurement criteria and monitor performance. The aim is not only to name a problem, but to offer institutional managers something they can actually use.

2. Literature Review

2.1 Technostress in Organisational and Educational Settings

Technostress began as an organisational-behaviour concept. If an ODL institution is read as an organisation that serves people through technology, that body of work applies to it directly. The work of Brod (1984) was the first to define technostress as a work-related problem. Tarafdar et al. (2007) built on that work by identifying five dimensions: overload, invasion, complexity, insecurity and uncertainty. Tarafdar et al. (2011) extended this by examining the creators, outcomes, and inhibitors of technostress in organisational contexts. These dimensions were then tested in organisational context by Ragu-Nathan et al. (2008) and they found that these negatively affected productivity and satisfaction. Tarafdar et al. (2019) also found a difference between techno-distress and techno-eustress, indicating that the design of technology systems influences the type of stress. The pattern holds in educational settings too. Badali et al. (2022) found that motivation-based instructional design lowered technostress in online learning environments. Cocorada and Maican (2025) found that access to an ICT helpdesk was the single strongest moderating factor across two academic years. Rai (2025) showed that technostress sits in the middle of the link between job demands and well-being in blended-learning settings.

Almost all of this evidence comes from well-resourced settings. For example, Indian studies involving IT industry professionals revealed that the factor with the highest association to burnout was the techno-invasion outside work hours (Sharma & Agarwal, 2022). Hybrid working also brings heightened boundary management problems and technostress for Indian knowledge workers, according to Verma and Singh (2023). Nascimento et al. (2024) found evidence of techno-eustress among higher-education teachers, but noted that this positive dimension depends on adequate institutional support – a resource most ODL learners in low-resource settings do not have. For adult ODL learners in low-resource settings who are managing work and study on the same device, such conditions are not occasional or unusual; they are daily life.

2.2 The Digital Divide and Equity in ODL

The gap, as van Deursen and Helsper (2015) argue, is not only in terms of access to devices, but also in the effective use of such devices for learning; how these are used to learn is also a factor that influences the digital divide. The pandemic has also been found to exacerbate rather than generate new inequalities, according to Guo and Wan (2022).

Studies by Ma et al. (2026) revealed that learners' attainment from online learning was better in the context of a quiet room, as opposed to the hardware, because the quiet room and mental space

helped learners learn. Cao et al. (2025) found that students with shared or small screens reported more strain regardless of connection quality. The conditions surrounding learning shaped the experience of learning itself.

Mpungose (2020) documents the implementation of new systems and the instructions for teaching through them by South African university lecturers with little training and the resulting anxiety for months. Iivari et al. (2020) discovered that the students who had been struggling prior to remote learning were the ones who were most negatively affected by the experience. The findings by Zheng et al. (2024) support this, as it was noted that there was a widening of the education gap in remote learning, with the most disadvantaged learners suffering the biggest losses. Bozkurt et al. (2020) identified this trend on a global level and suggested that it revealed system-level inequities in ODL systems all over the world as a result of the COVID-19 disruption of education. Building on van Dijk's usage-gap theory, Matsilele (2023) concluded that, in South Africa, journalism students who were not given a fair chance of access to digital tools were unable to engage in student-centred online learning despite the fact that their South African institutions had implemented pedagogical approaches specifically aimed to increase engagement. The experiences are exactly what technostress research had been aimed to explain, but none of the studies above draws on the technostress literature, as far as this review could establish. That is the gap the present paper takes up.

2.3 Where the Gap Is Visible

According to Cataldo et al. (2025), housing conditions associated with poverty accounted for roughly 33% of the variance in technostress among Chilean university students, while technostress accounted for a meaningful fraction of students' dissatisfaction. Housing conditions were more implicated than access to devices; the issue was not having something to study on, but having somewhere to study. Bravo-Adasme and Cataldo (2022) found that the stress levels of these students were comparable to those working in high-pressure office settings, arising in part because the students lacked prior digital experience and were forced into remote study. Toquero (2023) observed that rural, first-generation students in the Philippines faced greater technostress than their urban peers, even after accounting for differences in device access. In Vietnam, techno-complexity was explained by the number of shared household devices (Pham & Ho, 2024). Most of the available evidence comes from Latin America and Southeast Asia, even though ODL enrolments in sub-Saharan Africa and South Asia are higher than in any other world region, and this absence of evidence limits the generalisability of existing findings.

This skew matters for more than data coverage. Kormos (2026), working with rural K–12 teachers in a Midwestern context, found that reliable home internet access ranked as the single most pressing external barrier to effective online instruction – a finding that speaks directly to the technostress conditions described in this paper, though again from a context far removed from the Global South. Without equivalent evidence from African and South Asian ODL populations, it is

not possible to say how much of what has been found in Chile, the Philippines, or Vietnam would hold in Nigeria, Bangladesh, or India.

3. Methodology

3.1 Rationale for Bibliometric Analysis

Bibliometric analysis is used to map the intellectual structure of a field in a way that is systematic and reproducible (Donthu et al., 2021). It suited this study because the argument being made is a field-level argument: to show that technostress has not been treated as an ODL equity variable requires field-level evidence, and a literature narrative alone would not be sufficient. Two tools were used. Biblioshiny, from the bibliometrix R package (Aria & Cuccurullo, 2017), ran five analyses: keyword co-occurrence mapping, intellectual-lineage mapping (historiograph), thematic clustering using Louvain community detection, source-concentration analysis under Bradford's Law, and keyword positioning using the Callon centrality-density map. VOSviewer 1.6.20 was used independently to cross-validate the cluster structure from the thematic map. These tools identify structural patterns in published scholarship; they do not establish causes. The causal claims in this paper come from the empirical studies reviewed in Section 2, not from keyword counts.

3.2 Search Strategy and Corpus Construction

In April 2026, three Boolean search strings (see Appendix 1) were used to obtain records from Scopus. The strings combine keywords for technostress, ODL, digital equity and the digital divide, searched in the title, abstract and keyword fields. Scopus was used as the only database because it supplies consistent, exportable records (author keywords, cited references, affiliations) that Biblioshiny and VOSviewer read without conversion, and because its coverage of education, information-systems and social-science journals is broad. Merging a second database would have meant reconciling different export formats and citation records, which brings its own risk of error. The trade-off is narrower coverage: work indexed only elsewhere, in Web of Science or regional databases for example, is not captured, and this may shape the picture of where technostress and equity research meet (see Section 6.3).

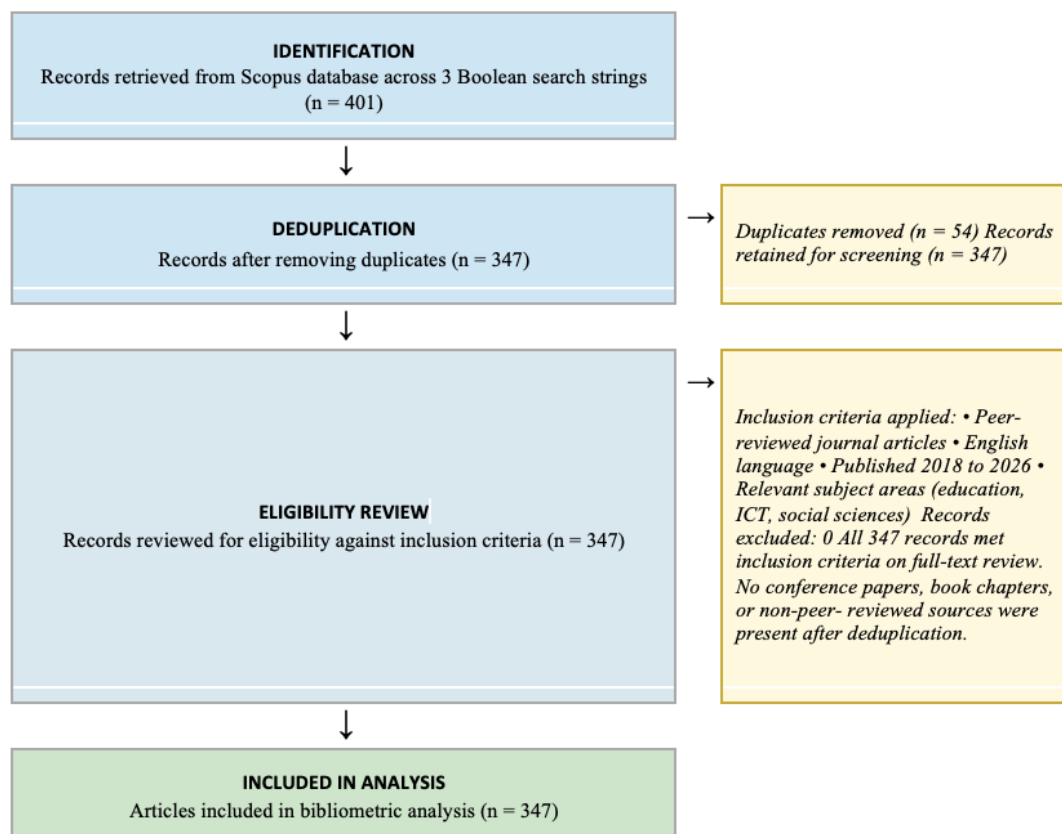
The inclusion criteria include peer-reviewed journal articles that are published in English in the years 2018–2026, and have a focus on education, information systems, social sciences and ICT.

Exclusion criteria: conference papers, book chapters, non-English articles, and articles from outside the relevant subject areas.

String 1 provided 112 records, String 2 provided 158 records, and String 3 provided 131 records. When adding all three numbers together before deduplication, the sum is 401. After 54 duplicate records were removed, 347 records remained. Duplicates were identified by matching DOIs and, for records without a DOI, by matching titles and first authors; each flagged pair was checked by

hand before one copy was removed. All 347 were peer reviewed journal articles and there was no need for additional filtering at the eligibility stage as the Boolean strings had already reduced the results to peer reviewed articles in the appropriate subject areas before retrieval. In total, 347 peer-reviewed articles from 2018 to 2026 were selected as part of the final corpus. The complete process of selection is illustrated in Figure 1. The parameters used for the Callon thematic map in Biblioshiny were a minimum of 2 for the keyword frequency, a community-repulsion value of 0.5 and a community detection using Louvain. In the VOSviewer co-occurrence network, the number of occurrences for the keywords was filtered to a minimum of 5, the normalisation method was association strength, and the Louvain resolution value was set to 1.0. All parameters are detailed with the full information to allow the analysis to be reproduced.

Figure 1. Selection Process for Bibliometric Corpus



All 347 records surviving deduplication met inclusion criteria on full review. No additional exclusions were required because the targeted Boolean search strings filtered to peer-reviewed articles in relevant subject domains prior to retrieval.

3.3 Use of AI Tools

During manuscript preparation, the author used Grammarly and Outwrite to improve clarity and flow. The bibliometric analysis, interpretation of findings, and development of the ECTF were carried out by the author; AI tools were not used to generate findings, conclusions, or arguments.

4. Findings: What the Bibliometric Evidence Shows

4.1 Corpus Overview

Table 1 presents the key corpus statistics. The dataset covers nine years, with an annual growth rate of 6.05%, pointing to sustained and growing research interest across technology-enabled learning and equity topics. All 347 documents are peer-reviewed journal articles; there is no grey literature in the corpus.

Table 1. Summary Statistics of Bibliometric Corpus (Source: Biblioshiny, Bibliometrix R Package)

Metric	Value
Timespan	2018 to 2026
Total documents	347
Source journals	187
Annual growth rate (%)	6.05
Average citations per document	15.4
Total authors	1,079
Author keywords (DE)	1,251
International co-authorship (%)	23.63
Document type	Peer-reviewed journal articles: 347 (100%)

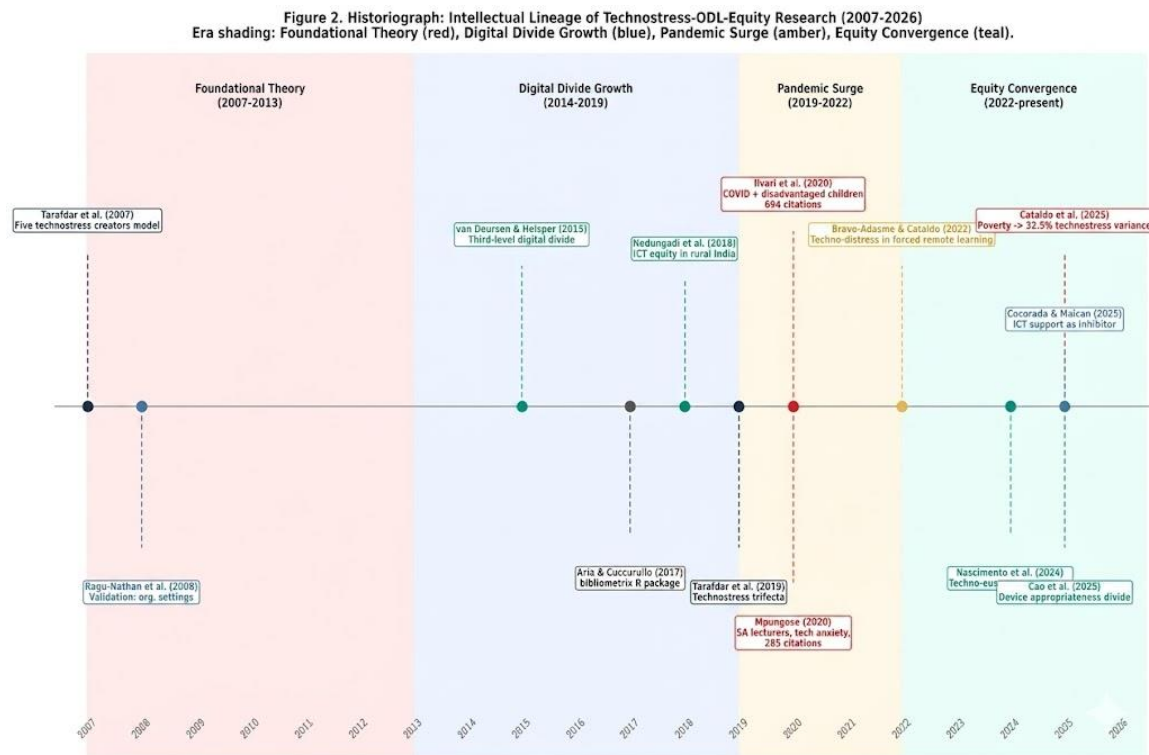
4.2 The Core Finding: Technostress Is Largely Absent from the Equity Conversation

This pattern appears in all five analyses. For example, the keyword co-occurrence map shows 107 co-occurrences of the term e-learning over 347 documents while there are only seven co-

occurrences of the term technostress. Technostress is not totally absent in the field but it is more marginal and it does not penetrate the field of equity. The thematic analysis revealed five clusters, among which technostress was placed in Cluster 3 (labelled Education). Cluster 3 had the second-highest internal density of the five clusters, at 73.43. On the face of it, this is encouraging: education and pedagogy researchers have done serious work in this space, and a growing body of literature exists. In contrast, the keyword-positioning analysis places technostress in the lower-left quadrant of the Callon map, with MCA coordinates of -0.92 and -1.43 . The clusters retain only weak ties to equity and digital-divide concepts. Technostress researchers occupy the same broad thematic neighbourhood as equity researchers; there is little sign in the citation record that they read each other.

The historiograph is instructive (see Figure 2). This is only a fleeting and barely connected interaction between two citation traditions between 2007 and 2022. A second strand of the equity discourse, which originated in the technostress strand (Ragu-Nathan et al., 2008; Tarafdar et al., 2007), also emerged but has not meaningfully been connected to the equity discussion; it is a more separate strand. The research on digital equity and ODL can be traced back to the work of van Deursen and Helsper (2015) and Iivari et al. (2020) and Mpungose (2020) during the pandemic. Both lineages study the same learner populations, yet neither has informed the other.

Figure 2. Historiograph: Intellectual Lineage of Technostress-ODL-Equity Research (2007–2026). Each node is a frequently cited paper, placed by year of publication; each line links a paper to an earlier one it cites, so connected chains show how ideas passed between works.



Only two papers in the entire corpus – Cataldo et al. (2025) and Bravo-Adasme and Cataldo (2022) – examine socioeconomic conditions as drivers of technostress. Every other technostress study in the corpus treats it as a psychological state located within the individual. Of the 74 equity and digital-divide papers in the corpus, very few use technostress as an analytical tool. The thematic cluster structure is shown in Figure 3. The Bradford's Law source analysis shows the evidence scattered across 187 journals, with no specialist ODL journal in the Zone 1 core (see Figure 4). There is no single outlet where technostress and equity researchers would regularly encounter each other's work, and this structural gap in publication venues reinforces the intellectual gap the other analyses reveal.

Figure 3. Thematic Map: Strategic Diagram of Research Clusters. Each bubble is a keyword cluster. The horizontal axis shows centrality (how strongly a cluster connects to others) and the vertical axis shows density (how well developed it is internally); the lower-left quadrant holds emerging or marginal themes.

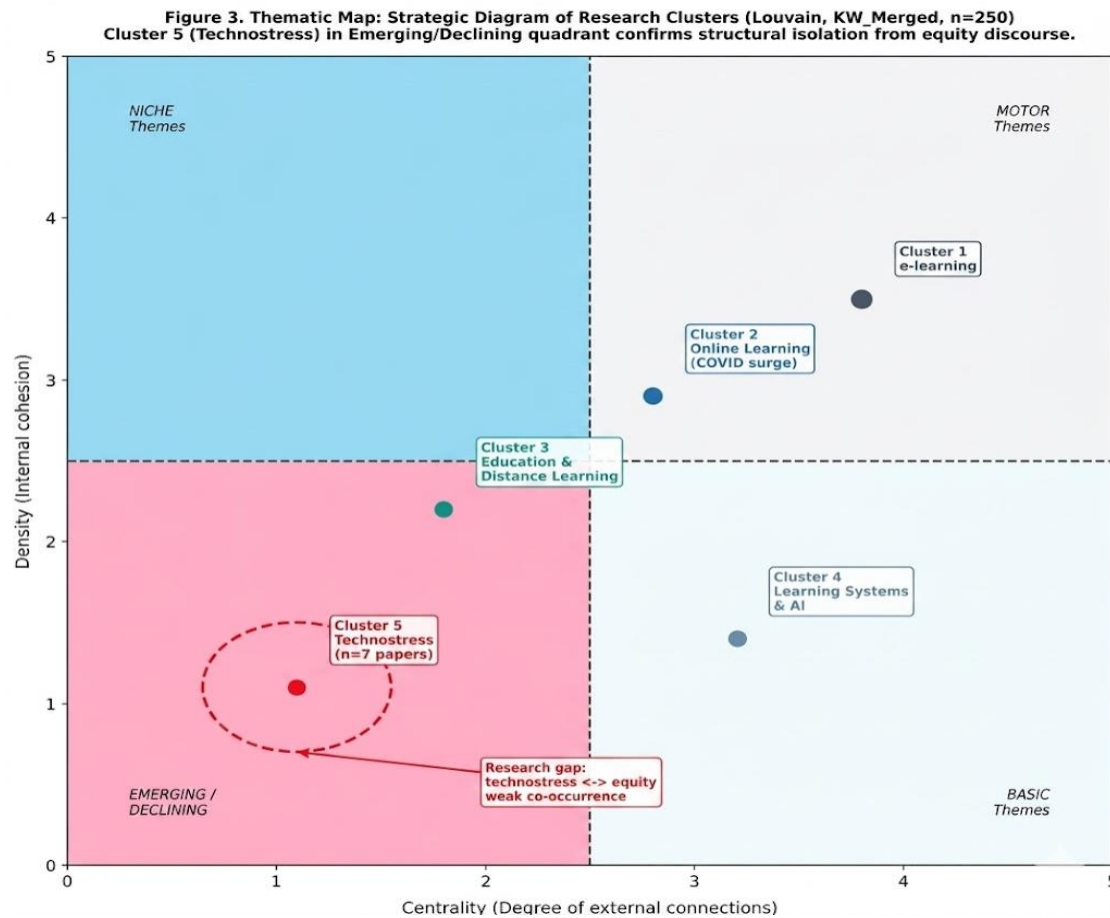


Figure 4. Bradford's Law: Source Concentration by Zone. Journals are ranked by the number of articles they contribute and divided into three zones that each hold about a third of the articles; Zone 1 is the small core of journals producing the first third.

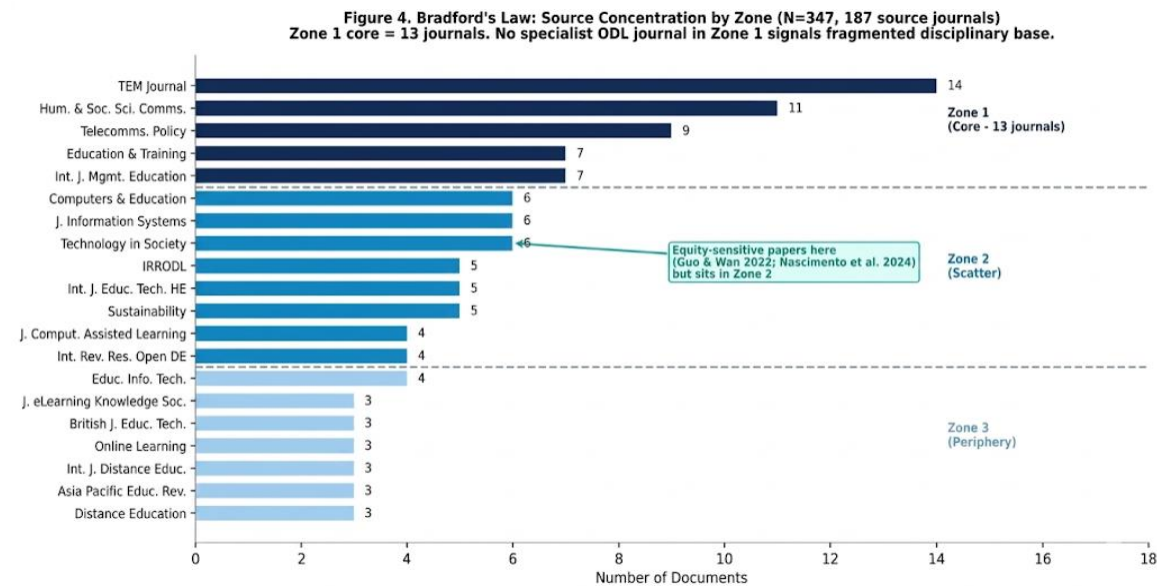


Figure 5. Hierarchical Clustering Dendrogram of Author Keywords. Keywords are grouped by how often they appear together in the same articles; those that join at a lower height co-occur more often and form tighter groups.

Figure 5. Hierarchical Clustering Dendrogram of Author Keywords (Biblioshiny, bibliometrix R package).

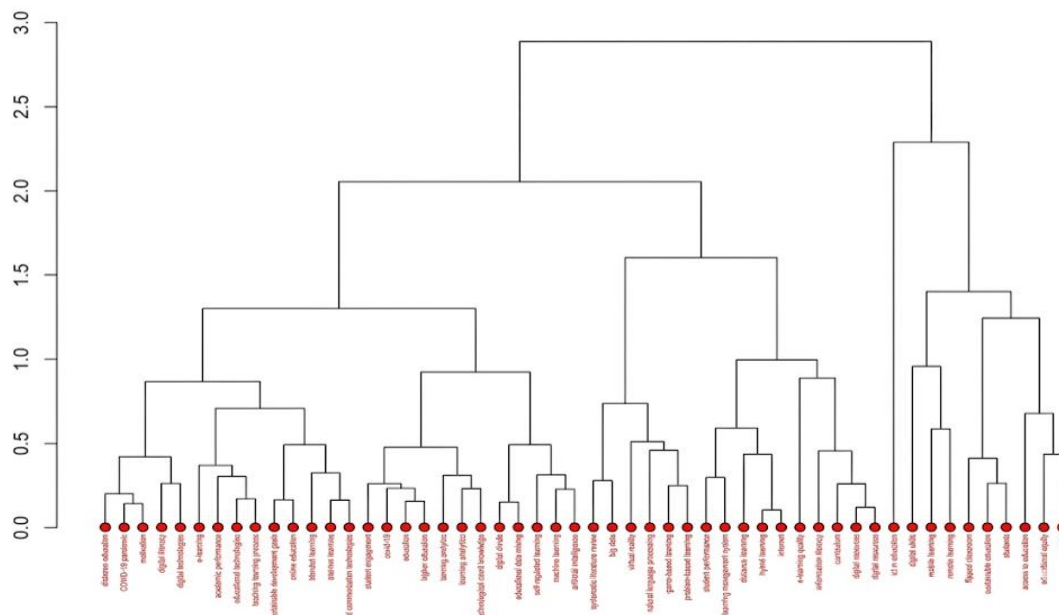


Table 2 summarises the five clusters, their Callon centrality and density scores, and their equity relevance. The hierarchical clustering of author keywords is shown in Figure 5.

Table 2. Thematic Cluster Summary with Callon Map Positions and Equity Relevance

Cluster	Label	Centrality (Callon)	Density (Callon)	Equity relevance
1	E-learning	73.43	56.10	Dominant cluster; equity framing present but thin
2	Online learning	111.34	55.06	Post-pandemic cluster; high centrality; equity rarely foregrounded
3	Education	98.64	73.43	Technostress sits here (7 occurrences); internally developed but equity linkage weak
4	Learning systems	55.06	98.64	AI and systems topics; equity-technology links underdeveloped
5	Curricula	56.10	111.34	Niche design and curriculum cluster; peripheral to equity discourse

5. The Equity-Centred Technostress Framework (ECTF)

Section 4 identified a gap: technostress and equity research have run alongside each other for years without meaningful cross-pollination. The ECTF is a response to that gap, not a set of conclusions drawn from it. It gives ODL institutions a common language that connects the psychological dimension of stress, as studied in the technostress literature, to the structural dimensions addressed in the equity literature. The four propositions below are not conclusions from the bibliometric evidence; they are directions for primary research that the bibliometric patterns suggest are worth pursuing, and they still have to be tested.

The framework rests on two theoretical foundations. Conservation of Resources (COR) theory (Hobfoll, 1989) suggests that individuals with fewer resources are more vulnerable to resource loss under the strain of demands; for an ODL learner facing unstable connections or unavailable platforms, the resources lost are time, motivation, and self-efficacy. Digital Equity theory (van Dijk, 2005) locates exclusion across four levels of access – motivational, physical, skills-based, and usage-based. Technostress sits within the skills and usage levels, and the ECTF extends van Dijk's third and fourth levels into the psychological domain. From this foundation, the framework generates four propositions for empirical testing.

Proposition 1: To the extent that people have fewer material resources, they will be more likely to experience technostress arising from device inadequacy, intermittent connectivity, lack of familiarity with or skills in specific platforms, and lack of support. Initial evidence from Cataldo et al. (2025) in Chile, which measured poverty-related conditions, suggests that these conditions account for almost a third of the variance in technostress in an ODL sample.

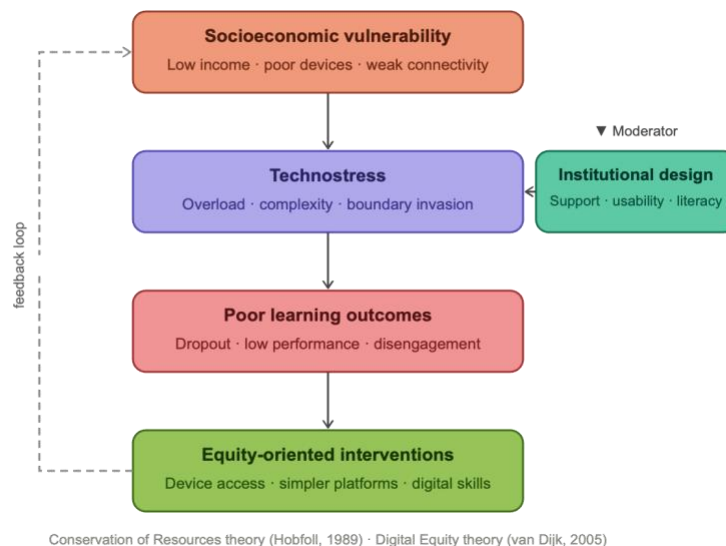
Proposition 2: Technostress will be associated with lower performance, lower satisfaction, and higher dropout among learners who are already disadvantaged in some way, with compound rather than simply additive effects expected. Primary testing in ODL populations is required before any causal link can be established.

Proposition 3: Institutional design moderates the relationship between socioeconomic vulnerability and technostress. ICT helpdesk support, adaptive platforms, and pre-emptive digital-literacy training may each function as mechanisms for reduction. Indirect evidence comes from Cocorada and Maican (2025), who examine ICT-related inhibitors of student satisfaction. The moderating effects of institutional design have not yet been studied in low-resource ODL settings, where institutions can address the experience of stress even where they cannot alleviate the underlying poverty.

Proposition 4: Learning outcomes and technostress reduction can be pursued simultaneously through equity-oriented interventions such as device adequacy, simplified platforms, and digital-literacy support. This is the most practically important proposition, and the one most in need of demonstration through intervention trials.

Figure 6 shows the full ECTF model. Socioeconomic vulnerability shapes how much technostress a learner is exposed to, working through three creator dimensions: techno-overload, techno-complexity, and techno-invasion. Institutional-design quality acts as a moderator on that pathway. Two types of outcomes follow: learning-outcome inequality, which shows up as dropout and performance gaps, and participation barriers, which show up as low engagement and withdrawal. Equity-oriented interventions target both vulnerability and institutional design and feed back into the model.

Figure 6. The Equity-Centred Technostress Framework (ECTF)



Learners with low income, poor devices, and weak connectivity carry more technostress into their studies, experiencing greater overload, complexity, and boundary invasion than their better-resourced peers. That burden can be mitigated through institutional design – support, usability, and digital-literacy provision – even where circumstances themselves do not change. If left unmanaged, accumulating technostress leads to dropout, lower performance, and disengagement. Equity-oriented interventions that reduce vulnerability at the source are consistent with both Conservation of Resources theory (Hobfoll, 1989) and Digital Equity theory (van Dijk, 2005).

5.1 What This Looks Like in Practice

IGNOU (Indira Gandhi National Open University) is used here as an illustration of how the framework's concerns might look on the ground, not as evidence for it. As the national open university of India, it has over three million students, many of them adult women from rural areas who share smartphones carrying only 2G connectivity and complete coursework after household chores are done. The official platform assumes a stable internet connection, frequent app updates, and functions distributed across multiple platforms – assumptions that can make or break a course for women, especially adult learners in rural India, who have limited hours per day and, at best, an unreliable connection. Evidence from rural India shows that mobile technology and WhatsApp-based interventions do improve learning outcomes in remote village settings (Nedungadi et al., 2018), yet the psychological stress of navigating multiple platforms on an unreliable connection remains unaddressed. Technostress itself is yet to be monitored (Balasubramanian et al., 2009) and in the case of IGNOU the access has been made easier but access has yet to be considered from a psychological perspective. This applies outside of South Asia too; Tait (2018) adds that in sub-Saharan Africa learners lead full lives and have competing roles, with little institutional support.

Shared devices, power cuts, and unfamiliar web interfaces are associated with techno-overload, techno-complexity, and techno-invasion, none of which is visible in typical completion statistics. The numbers alone do not reveal why learners leave.

5.2 Operationalising the ECTF

Table 3 maps the ECTF to measurable variables and instruments. A simple empirical test is a mediation-moderation design in which socioeconomic vulnerability is the independent variable, technostress is the mediator, institutional-design quality is the moderator, and learning outcomes is the dependent variable. Two survey waves – one at enrolment and one mid-course – linked to disaggregated completion records, could test all four propositions together.

Table 3. ECTF Variables and Measurement Instruments

Role	Variable	Operationalisation	Instrument
Independent	Socioeconomic vulnerability	Income, device adequacy, study environment, digital experience	MPI (Cataldo et al., 2025); device appropriateness scale (Cao et al., 2025)
Mediator	Technostress	Overload, complexity, invasion, insecurity, uncertainty	Technostress Creators Scale (Ragu-Nathan et al., 2008), adapted for ODL
Moderator	Institutional design	Platform complexity, ICT support, digital-literacy provision	Technostress Inhibitors (Cocorada & Maican, 2025); platform usability rubric
Dependent	Learning outcomes	Performance, completion, satisfaction, dropout	Grade records, retention data, SES-disaggregated satisfaction surveys

6. Discussion

6.1 What This Paper Adds to the Field

The broader ODL literature has consistently asked whether open and distance education actually reaches the learners it is intended to reach, and whether institutional practices help or hinder that goal (Birdsall, 2021; Kanwar & Sanjeeva, 2022; Olakulehin & Ojo, 2013). This paper takes that question somewhere the field has not previously gone. Most existing studies have been conducted

focusing on access to ICT, learner assistance and digital inclusion, while research on the psychological burden that technology imposes on already under-resourced learners remains scarce.

The bibliometric work shows one thing clearly: the gap appears consistently across five separate analyses. The ECTF does something different – it proposes a way of thinking about why that gap matters in practice, and what institutions could do if they took it seriously. Device appropriateness (Cao et al., 2025) maps onto techno-complexity in the framework; physical-environment constraints (Cataldo et al., 2025) map onto techno-overload; and absent institutional support maps onto techno-insecurity. These connections are not findings from the bibliometric analysis; they come from the small body of primary empirical work reviewed in Section 2. The ECTF does not prove these connections – it organises them into a form that institutions can use and that researchers can test.

The propositions also connect to management thinking that higher-education institutions already use. Tinto's (1993) model, developed for campus-based settings, treats persistence as the result of how well an institution integrates its learners, and Proposition 3 makes a parallel claim: institutional design shapes how much strain vulnerable learners experience. The call to disaggregate completion data follows the logic behind the balanced scorecard (Kaplan & Norton, 1992). An institution that tracks only aggregate completion has chosen a measure that cannot register this kind of harm. For governing bodies, then, the ECTF adds one indicator to accountability systems that already exist. It does not ask them to build new ones.

6.2 What This Means for ODL Institutions and Their Management

Read as a management problem rather than a purely educational one, the four propositions translate into four ordinary management functions: intake and screening, procurement, performance measurement, and organisational culture. None of these are unfamiliar to managers outside the education sector; what is missing in ODL institutions is the will to apply them to technostress specifically. The practical implications are specific, and none require a complete overhaul to act on. The first concerns knowing who is struggling before they disappear. Learner-needs assessments need not be limited to device access; using a short, adapted version of the Technostress Creators Scale (Ragu-Nathan et al., 2008) at enrolment could identify students at risk of failing the course before they do so. This adds approximately one page to an intake form – a small cost for what early identification can avert. The second concerns platform design. Not all features carry equal weight: an application that requires three or more separate tools to complete one task, or that routinely forces students to download large volumes of data over slow connections, is a tangible equity threat. Equity-weighted procurement criteria would include device compatibility, update frequency, and navigation complexity as standard. The third concerns what institutions actually count. Aggregate completion figures hide as much as they reveal; an 80% overall completion rate looks like a success until the rate for the lowest-income learners turns out to be 55%. The students who did not complete were not absent by accident – they faced financial pressures, stretched

responsibilities, and very little room for error. In a systematic review of higher-education attrition (Rotar, 2022), the researcher found that learner support is a continued gap in the models that currently exist for higher-education retention; directly alongside the ECTF's identification of techno-insecurity, learner support is missing. IGNOU and UNISA (University of South Africa) are useful illustrative cases here. This paper offers no evidence that these patterns hold at either institution, and testing whether they do is part of the empirical agenda set out above. The fourth implication, and perhaps the hardest to quantify, is an institutional commitment to treating technostress as real. A learner who cannot use a platform, or cannot establish a secure connection, is not personally deficient – they are being poorly served by a system not designed for them. The other three steps carry meaning only when applied to this specific recognition, and incorporated into institutional accountability systems. Without a commitment to measure, institutions cannot fix what they will not see.

6.3 Limitations

This paper has five limitations.

The first concerns what bibliometric work can actually tell us. It maps a field, showing where discussion is happening and where it is not, but it cannot explain why those patterns exist. This paper does not rest its equity argument on keyword frequencies alone; the argument draws on the empirical studies reviewed in Section 2, and that distinction matters. Second, this study was restricted to Scopus-indexed, English-language articles – a genuine limitation, since a great deal of valuable scholarship from the Global South is published in local journals and other languages and does not make it into that database, quietly going unnoticed in reviews such as this one. Third, the research directly linking poverty to technostress in ODL is still quite thin; the studies that exist come from Chile, the Philippines, and Vietnam, and there is not a single primary quantitative study testing this relationship in an African or South Asian ODL context. The ECTF is built on the best evidence currently available, but whether it actually holds at institutions like IGNOU or UNISA remains an open question that this field has not yet answered. Fourth, screening and eligibility decisions were made by the author, with independent oversight from the doctoral supervisor, who served as a second reviewer at the eligibility stage. This reduces, but does not eliminate, the selection-bias risk that comes with bibliometric work; a formal inter-rater reliability statistic was not calculated, and further replications should use full dual-reviewer screening with reported agreement statistics.

Fifth, bibliometric findings depend on the keywords authors choose when submitting their work for indexing. Studies directly relevant to this topic that do not use the word technostress in their keywords would not appear in the corpus. The seven-occurrence count almost certainly understates how much the equity literature is already engaging with technology-related stress, simply under different labels. The ECTF propositions remain untested and require primary research to confirm or challenge them before any causal claims can be made.

7. Conclusion

Many ODL learners in low-resource settings carry a psychological cost that their institutions never see and never measure. That cost is technostress, and it does not fall equally – it hits hardest on the most stretched learners. Across five separate bibliometric analyses of 347 documents, the same pattern shows up each time: technostress researchers and equity researchers are writing about the same learners with little sign of being in conversation with each other. This is not a problem with any single study; it looks like a structural gap in how the field has set up its questions, and one the evidence suggests is worth taking seriously.

The ECTF is offered as a bridge, and as a management tool. It is a propositional framework, not a validated model: its four propositions are untested, and what it implies for management practice stays provisional until primary research supports it. It brings together what is known about technostress, about resource-based stress theory from organisational behaviour, and about digital equity, and organises this into a form that ODL institutions and their managers can use and that researchers can test. The steps this paper points to are not complicated, and all fall within ordinary institutional management practice: screening at enrolment for technostress risk, taking equity into consideration when procuring platforms, and disaggregating completion data by socioeconomic status are all feasible. What has been lacking is a common conceptual space in which equity, technology design, and institutional management intersect, and where managers must consider all three simultaneously. What the field needs next is primary empirical work: longitudinal studies in African and South Asian ODL populations, a validated instrument for low-resource ODL settings, and intervention trials testing what works, managerially, to reduce technostress among those who carry it most.

Declarations

Author Contribution

Tejal R¹: Conceptualisation, methodology, data collection, formal analysis, writing (original draft).

Sethumadhavan R²: Supervision, writing (review and editing), validation.

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Competing Interests

The authors have no competing interests to declare that are relevant to the content of this article.

Data Availability

The bibliometric dataset used in this study was extracted from Scopus. The Biblioshiny output files supporting the results are available from the corresponding author on reasonable request.

Ethics Approval

This study did not involve human participants, animal subjects, or personal data. Ethics approval was not required.

AI Assistance Declaration

AI-assisted language-editing tools were used to improve the readability, grammar, and phrasing of this manuscript. All research design, data analysis, theoretical-framework development, and intellectual content are solely the work of the author.

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Appendix 1: Search Strings

The following search strings were applied to the Scopus database in April 2026 and are reproduced in full to enable replication.

Search String 1 (returned 112 records before deduplication):

TITLE-ABS-KEY(technostress OR “technology stress” OR “digital stress” OR “ICT stress” OR “techno-overload” OR “techno-invasion” OR “techno-complexity”) AND TITLE-ABS-KEY(“open and distance learning” OR ODL OR “distance education” OR “online learning” OR “e-learning” OR “digital learning” OR MOOCs OR “virtual learning” OR “blended learning”)

Search String 2 (returned 158 records before deduplication):

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TITLE-ABS-KEY("open and distance learning" OR ODL OR "distance education" OR "online learning" OR "e-learning" OR "digital learning" OR MOOCs OR "virtual learning" OR "blended learning") AND TITLE-ABS-KEY(equity OR "digital equity" OR "educational equity" OR inclusion OR "social inclusion" OR "digital divide" OR access OR "learning access" OR "education access")

Search String 3 (returned 131 records before deduplication):

TITLE-ABS-KEY("digital divide" OR "digital inequality" OR "technology access" OR "ICT access" OR "internet access") AND TITLE-ABS-KEY("learning outcomes" OR "academic performance" OR "student success" OR "learning success" OR "learner engagement" OR "student well-being" OR "educational outcomes")

Total records before deduplication: 401. Duplicates removed: 54. Final corpus: 347 documents.
All 347 met inclusion criteria on review. See Figure 1 for the full selection process.