Digital Fatigue among School Teachers in Post-Pandemic Education

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Abstract

Educators all over the world have witnessed profound changes in their work conditions resulting from the COVID-19 pandemic. Pedagogical and technological shifts in the landscape of education are reshaping the engagement of teachers with digital devices. As a result, many educators are experiencing digital fatigue. Digital fatigue encompasses cognitive, emotional and physical exhaustion due to extensive and intensified use of information and communication technologies (ICTs). Fatigue arises from the continuous digital engagement required at work. At the same time, the demand for remote collaboration tools and platforms has increased dramatically. The pandemic has changed not only the way education is delivered but also the way teachers engage with educational materials and learn new knowledge about teaching and learning. The popularization of online learning management systems (LMSs) and the need to integrate diverse mode of information—text, graphic, audio, and video—facilitate sharing learning materials remotely, and at the same time, teachers need to flexibly change formats according to different students' needs. Furthermore, extensive time spent on distance teaching and learning has compelled educators to invest more efforts into understanding digital tools and media. Digital fatigue is often confused with teacher burnout. While burnout refers to prolonged occupational stress, digital fatigue is a second-order effect associated with the widespread use of ICTs and occurs more frequently in remote working environments. Digital fatigue, therefore, is a key factor influencing teachers' well-being and their digital competence (De Laet et al., 2022).

Keywords: *COVID-19 pandemic, information and communication technologies (ICTs), learning management systems (LMSs).*

1. Introduction

The collective experience of educators during the recent pandemic has highlighted a phenomenon referred to as 'digital fatigue', which was also present prior to the pandemic but may have intensified as a result of recent changes. Significant shifts in educational practices and intensified pedagogical demands have rendered many teachers more susceptible to this experience, making its investigation more relevant than ever. This term has emerged from an understanding of extensive activity related to new information and communication technologies (ICT), sparked by the pervasive use of digital devices and learning platforms during the pandemic. Digital fatigue is defined as a psychosocial condition associated with the educational use of digital technologies and may stem from the overload of ICT-related commitments, excessive multitasking or engagement with diverse formats, along with the use of technology outside scheduled hours for educational purposes.

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Digital fatigue is closely linked to the phenomenon of 'technostress', but more specific, as it relates to an individual's learning or teaching activity, while the broader term may refer to all technology-based activities. Distinct responses to the pandemic illuminated the concept, leading to an investigation of fatigue intensity, distribution, technologies fostering fatigue, workload indicators of fatigue, and organizational factors. Modes of educational delivery have changed significantly since the onset of the pandemic, emerging as a perfect opportunity to examine digital fatigue, alongside other information problems such as the digital divide and equity gaps. Subsequently, attention is drawn to explanatory and delimiting factors of digital fatigue among school teachers and some insights are provided on the country of implementation (An et al., 2021) ; (Gutentag & S. C. Asterhan, 2022).

2. The Post-Pandemic Educational Landscape

The COVID-19 pandemic has fundamentally altered the operating landscape of K–12 education. Many teachers have reassessed their pedagogical practices after extensive experimentation with remote and blended learning. Policy makers and administrators, too, have taken stock of the effectiveness of existing models and have begun making adjustments to rules and regulations. These shifts have resulted in increased reliance on digital technologies and in the adoption of innovative practices that encourage broader access and deeper engagement. Alongside these promising developments, however, educators also report heightened levels of fatigue, stress, and burnout, a trend that many attribute to the extensive use of digital technologies (T. Marshall et al., 2022) ; (An et al., 2021).

3. Conceptualizing Digital Fatigue

Digital fatigue refers to the aversive psychological state experienced when a considerable quantity of technologies is employed for educational work (Gutentag & S. C. Asterhan, 2022). It differs from burnout in educational work, given that burnt-out teachers continue to perform their pedagogical tasks. Similarly, digital fatigue is distinct from cognitive overload, an infrequent educational problem not deserving of mention among school teachers (Chou & Chou, 2021). The digital fatigue concept is fundamental for discerning the burden of educational technologies on teachers in the post-pandemic educational landscape.

A preliminary working conceptualisation of digital fatigue in educational work defines four constituent dimensions: cognitive, emotional, physical, and time-based. The cognitive dimension pertains to the effort of extracting relevant information from multiple digital sources, sustaining attention to a continuing stream of discrete online objects, and shifting mental focus across distinct modes. The emotional dimension includes both positive and negative feelings experienced when engaging with educational technologies. The physical dimension encompasses the experience of discomfort or pain in the body following prolonged usage of digital devices. Finally, the time-based dimension refers to the perception that the time devoted to educational tasks with digital technologies exceeds what feels reasonable, irrespective of the actual duration.

4. Prevalence and Correlates among School Teachers

Research indicates that digital fatigue is common among school teachers. Writings on correlates identify associations with demographic characteristics and contextual factors at the individual, institutional, and national level. For teachers surveying seventy-eight systems and subsystems, women, older adults, and those in part-time roles—particularly in early

childhood education—reported higher fatigue levels, while faculty and positions requiring less persistence, remoteness, or hybrid instruction experienced lower fatigue. Additional analyses spanning twenty-three systems revealed that total hours worked, teacher-perceived technology intensity, work-life conflict, workplace agility, being a special education teacher, and workload all influenced digital fatigue. Studies focused on Thailand indicated greater fatigue among teachers in private or underfunded institutions.

Other writings focused on the education sector in Spain, Poland, Italy, France, Latvia, Lithuania, and Slovenia, where teachers experienced elevated cognitive or emotional fatigue, excessive exhaustion, physical fatigue, mental strain, or reduced interest. In France, communication technologies for remote or hybrid education increased telephone and video-call frequency, impairing emotional needs and intensifying person-centered professional demands. Such changes accelerated fatigue among teachers with young children, leading to emotional exhaustion and deteriorating teacher-student interactions, while demand-depletion and longer working days reduced life satisfaction. Additional studies in Poland, Italy, and Spain emphasized how technology use during the pandemic strained teachers' physical and mental health, hindered work-life balance, fostered family conflicts, and triggered feelings of exceeding burnout thresholds.

5. Mechanisms and Pathways Linking Technology Use to Fatigue

Technology-pervasive educational settings have been linked to cognitive overload due to unnecessary computer-related tasks, excessive multi-screen and multi-device loads, abrupt interruptions mandated by external parties through various communication channels, prolonged screen exposure time, unsuitable software and application interfaces, and added workloads stemming from poorly designed administrative and documentation responsibilities. These load sources are amplified when multiple digital devices are used simultaneously. Technology demands are also associated with job dissatisfaction and attrition intentions (Wang et al., 2023).

In addition to cognitive overload, other fatigue-related pathways have been highlighted. Continuous processing of written materials required by digital communication slows information acquisition relative to oral communication and is common when distributing learning resources. Intensive reading of written information posted via multiple communication tools is also required. Furthermore, software operations are vulnerable to device malfunctions, poor Internet connection, power shortage, low battery, unprocessed messages, and missing records. Interruption, reprocessing, and multitasking damage work momentum, impede intangible cognitive accomplishment, invite distraction and boost attrition intention. Contingencies affecting smooth technology use aggravate work difficulty (Chou & Chou, 2021).

Administrative tasks—such as filling out forms for staff meetings, managing student attendance, and compiling records for educational events—via e-platforms are increasingly common. Elaborate documentation before, during, and after information dissemination is less frequently required in face-to-face interactions. Owing to unstandardized school specifications and the explosive emergence of software platforms, coping often proves burdensome, especially when destruction fosters a cascading proliferation of supplementary arrangements, software installations, and materials compilation. Unadjusted administrative stipulations entrench unmanageable complexity.

6. Impacts on Professional Practice and Well-Being

The COVID-19 pandemic prompted rapid changes to the pedagogical landscape, the technology mandate, and workload requirements that altered the professional practice of teaching in profound ways. Educational continuity during school closures forced teachers to implement remote instruction and devise alternatives to in-person assessment. Teachers were equipped with digital devices, yet widespread disparities in the availability of electronic equipment, internet access, and technical support persisted. Pedagogy shifted towards open, flexible, peer-driven, and hybrid models. Formal changes to curricula and assessments, key enabling conditions for sustained pedagogical change, were enacted in some jurisdictions, but intense and sustained pressure to address unfulfilled curricular expectations created formidable disincentives. Teachers increasingly worked well beyond school hours to prepare lessons, communicate with students, provide feedback on submitted work, and accommodate the flexible scheduling imposed by schooling at home (Padmanabhanunni & B. Pretorius, 2023). Many secondary school teachers surveyed in English-speaking countries reported substantial reductions in job satisfaction, engagement, and motivation, spurred by heavy workloads, excessive digital technology use, conflicts between job demands and family responsibilities, and insufficient relief from decision-making tasks (Minihan et al., 2022). Newport (as cited in Gutentag & Asterhan), calls this work the "hardest easy job in the world." The pre-pandemic complexity of the role had increased exponentially during and in the aftermath of the pandemic.

Technological mediation of practice created a frenzy of intentional distraction, further complicating instructional planning and decision making, and reducing professional collaboration. The absence of more deliberate attention management generated agitation and additional mental load to regulate the cacophony of distractions. Well-established consultative structures and avenues for professional conversation within and across schools diminished considerably. The result was a "1-to-1-with-appointed-technology" system that placed unprecedented pressure on teachers in the routine of everyday practice. None were immune to pandemic-driven forces associated with the acceleration of tempo and amplitude of pedagogical transitions. Teachers bore the brunt of this turbulence in their professional practice, and many remained caught in a state of chaotic flux, indecision, and engaging in "log-on-log-off" activities that could not be effectively tackled and intensified non-trivial educational decisions, yet practice remained digitally mediated, and the manifestation of digital fatigue persisted.

7. Methodological Approaches to Studying Digital Fatigue

After the pandemic's onset, K–12 education shifted dramatically, demanding pedagogical adaptation, increased technology usage, and higher workloads. Reports of poor digital teaching experiences emerged globally. Systematic country-level comparisons are lacking but early surveys in select regions showed intensified cognitive, emotional, and physical fatigue among educators. During lockdown in Canada, teachers reported high levels of fatigue, burnout, anxiety, and stress. Teachers in Saudi Arabia, Finland, Turkey, New Zealand, and Thailand experienced both functional impairments and sensitivity to digital devices, hindering work and diminishing health, motivation, self-efficacy, and creativity. Texas educators reported high levels of emotional fatigue and distress following statewide law changes affecting teaching practices.

Pedagogy in the wake of the pandemic incorporates digital technology, information, processes, and resources, yet much of this remains tangential to core practice. Such peripheral reliance, involving the same resources used for non-educational purposes, generates distractions, interruptions, and demands on attention. País and Lasa (2021) proposed modelling "digital fatigue" as a

variant of cognitive overload specific to digital means and defined by extra effort and attention required. Fernández (2021) examined "technostress" in education; whereas conventional stress derives from excessive workload, technostress arises instead from elevated engagement with various tools.

Digital fatigue especially impedes educators' self-reporting of the phenomenon due to automatic adaptation following earlier lockdowns. Circularity complicates modelling of underlying mechanisms. Digital fatigue stems from the rise of hybrid work. Achieving an accurate, comprehensive model remains essential to guide further investigation and intervention. Initial formulations differentiate three levels of analysis: the macro-organizational level, focusing on the broad constraints on punctual task completion; the meso-group level, examining team-specific dynamics and temporal coordination; and the micro-individual level, investigating personal and contextual factors (Wang et al., 2023).

8. Strategies for Mitigation and Policy Implications

The transition from in-person education to remote, hybrid, or blended models has been sudden and extensive. Teachers have moved from familiar instructional approaches supported by traditional tools and resources to new models of learning where school-wide policies, government requirements, family situations, student preferences, work-life balance, technology access, personal and professional development, and mental health considerations have to be assessed. As schools have reopened in many jurisdictions, some teachers struggling with the dual workload of conventional and non-conventional instruction are increasingly expressing their fatigue. Interviews with teachers point to misalignment in expectations between central authorities and the realities on the ground, demanding more nuanced policies (An et al., 2021).

Individual, school, and district-level interventions can help mitigate digital fatigue. Allocating sufficient time and resources to the structures and systems teachers request can help reduce pressure. Professional development must support staff holistically, modelling care and connectedness while building the expertise to adapt and renew. Technology governance frameworks are essential to determine what digital autonomy should be retained amid rapid processes of consolidation and surveillance (T. Marshall et al., 2022).

9. Educational Leadership and School-Level Interventions

In order to reduce digital fatigue among school teachers, educational leaders are called to steer the proactive adoption of technology, support teachers in managing their workload, and engage them in shaping educational change. Strategies enabling school leaders to address teacher-level fatigue include building a positive school culture around technology implementation, nurturing open communication and listening to staff concerns, implementing supportive systems aligned with institutional goals, managing workload, and guiding teachers through processes of change.

Policies addressing these areas are necessary, since the decision to deploy additional instructional technology—both hardware and software—often lies beyond individual teachers' control, and platforms enabling such technology frequently introduce supplementary administrative duties. Ensuring teachers receive the accompanying support and guidance aligned with the newly introduced tools and practices proves vitally important (Doz et al., 2023).

10. Future Research Directions

Teachers around the world are experiencing high levels of digital fatigue—defined as exhaustion induced or exacerbated by pervasive use of digital media—to varying degrees (An et al., 2021). Digital fatigue appears to affect teachers' professional practice (e.g., instructional quality, decision-making, collaboration, professionalism) and general well-being (e.g., motivation, job satisfaction, mental and physical health). Digital fatigue is also associated with a wide range of "traditional" workload indicators—amount of lesson preparation, frequency of grading assignments, intake of administrative work—yet the nature of K-12 education in many countries continues to evolve, necessitating a closer examination of technology-related workloads.

While the notion of digital fatigue has been gaining traction in both scholarly and popular discourse, few educational researchers have rigorously conceptualized or investigated the phenomenon in depth. Discerning the primary determinants of digital fatigue among teachers therefore represents an important avenue for future research within the broader field of educational technology. Three specific questions merit particular attention. First, what measures, frameworks, constructs, and theoretical lenses have been deployed to capture and understand digital fatigue and how have these tools performed? Second, which causal pathways mediated by digital technology appear most salient in contributing to teachers' digital fatigue, taking into account workload and pedagogical context? Third, what external supports have proven most effective in mitigating teachers' digital fatigue and accelerating the development of appropriate mitigative infrastructures?

Additional methodological innovations promise to facilitate further exploration. To better monitor shifts in levels, determinants, and mitigating factors over time, new studies could deploy panel survey designs capable of generating longitudinal data yet still requiring limited burden from respondents. The emergence of data-harvesting applications capable of monitering multiple aspects of personal computing without direct user intervention now makes it feasible to supplement self-reported data collection with unobtrusive log file analysis that captures rich and detailed insights into individual technology usage. Finally, many studies have focused either on the same geographic context or on cross-national comparatives between high- and low-income settings. Further investigation of teacher fatigue in newly digitalized countries and regions yet to complete the technology integration journey would broaden the scope of the literature significantly.

11. Conclusion

Digital fatigue emerges as a distinct condition accompanying hybrid and digital educational endeavors, defined as the feeling of tiredness, exhaustion, and weariness derived from school technology use. A better understanding of its roots and effects ascertains the presence, correlates, and influencing factors of fatigue among school teachers. Practical implications are informative for districts, schools, educational leaders, and teachers, incorporating mitigation strategies as part of routine practice and addressing fatigue's many facets. Future research should examine the full range of moderators and stressors to validate and generalize results further.

Concepts of technology overload, technology intensity, and technology-induced stress and fatigue have been linked to teachers' decisions to remain in, temporarily leave, or exit the profession. Distinguishing between cognitive load, teacher distress, and technology use, digital fatigue analyses examine both the breadth and depth of teacher fatigue, defined as feelings of tiredness, exhaustion, and weariness derived from school technology use and encompassing cognitive, emotional, physical, and time-

based dimensions. Digital fatigue theory explains how conceptual learning-demand theory, overload theory, and attention restoration theory combine to show how technology demands lead to fatigue and its consequent symptomatology.

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