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From ICT Use to Technostress: Understanding Instructional Disruption among New Generation School Teachers

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ABSTRACT

The growing use of information and communication technology (ICT) has expanded teachers' professional responsibilities while creating new forms of technostress. This study examined relationships among ICT use, technostress, and instructional disruption among New Generation School teachers using an explanatory sequential mixed-methods design. Quantitative data from 118 teachers were collected through surveys, followed by technology-use logs and semi-structured interviews. ICT use was positively associated with technostress, while technostress was more consistently related to perceived disruption in planning, classroom management, student engagement, and classroom discussion. Qualitative findings highlighted after-hours ICT use, communication demands, email pressure, and technological uncertainty. Instructional disruption is linked less to ICT use itself than to stressful technological demands and organizational expectations.

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1. INTRODUCTION

Information and communication technology (ICT) has become integral to teachers' professional activities, supporting lesson preparation, assessment, communication, collaboration, administration, and interaction with students. Although ICT can improve accessibility and efficiency, its expanding use also creates additional demands because teachers must manage multiple platforms, respond to digital communication, adapt to technological change, and perform technology-mediated tasks beyond conventional classroom instruction (Tondeur et al., 2017; Marsh et al., 2022). The negative consequences of intensive technology use are commonly examined through the concept of technostress, referring to stress experienced when individuals have difficulty coping with technology-related demands. Five major technostress creators have been identified: techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty (Tarafdar et al., 2007; Ragu-Nathan et al., 2008). These dimensions respectively concern increased workload, intrusion of work into personal time, difficulty using technological systems, concerns about technological competence, and continual technological change (Ragu-Nathan et al., 2008; Salazar-Concha et al., 2021). For teachers, these pressures are particularly relevant because digital technologies can support teaching while simultaneously increasing documentation, platform management, communication demands, and expectations for continuous accessibility (Marsh et al., 2022).

ICT use and technostress should therefore be distinguished. Frequent ICT use does not necessarily indicate stress or poorer instructional quality because technology may support preparation, communication, and assessment. However, ICT use can become stressful when accompanied by excessive workload, unclear expectations, unreliable systems, inadequate support, or demands beyond working hours. Technostress is thus better understood as a response to technological demands than simply as the amount of technology used (Tarafdar et al., 2007; Ragu-Nathan et al., 2008).

This distinction is important in education because technological demands may interfere with core teaching activities. Time spent managing communication, digital platforms, technical problems, and administrative tasks may reduce attention available for lesson preparation, classroom management, student engagement, and classroom discussion. Technostress has therefore become an important occupational issue associated with teachers' working conditions, technological demands, and professional experiences (Estrada-Muñoz et al., 2020).

Nevertheless, technology should not be framed as inherently disruptive. Digital technologies can strengthen instructional practice when they are reliable, pedagogically appropriate, and supported by adequate competence and institutional conditions. Problems are more likely when technological requirements exceed teachers' available time, resources, competence, or organizational support. Effective technology integration therefore depends not only on technological access but also on teachers' ability to use digital tools meaningfully in professional and pedagogical practice (Tondeur et al., 2017).

The present study consequently uses the concept of instructional disruption rather than overall instructional effectiveness. Instructional effectiveness is a broad construct that generally requires evidence of teaching quality, student outcomes, or observed performance. This study instead examines teachers' perceptions of whether ICT use and technostress interfere with planning and preparation, classroom management, student engagement, and

classroom discussion. ICT use represents engagement with digital technologies, technostress reflects responses to technological demands, and instructional disruption represents perceived interference with teaching activities.

Although technostress has been widely studied in organizational and workplace settings, research focusing specifically on school teachers remains relatively limited compared with other occupational groups and higher education contexts (Salazar-Concha *et al.*, 2021; Kumar, 2024). School settings are distinctive because teachers must simultaneously manage instructional responsibilities, communication, administrative tasks, and interaction with learners (Estrada-Muñoz *et al.*, 2020). New Generation Schools therefore provide a relevant context for examining how ICT use, technostress, and instructional disruption are related.

The conceptual relationship examined in this study is illustrated in **Figure 1**. ICT use may generate instructional benefits as well as additional technological demands. These demands may contribute to technostress, which can subsequently be associated with perceived instructional disruption. ICT use may also be directly associated with instructional disruption when technological demands consume time or interfere with teaching activities, while organizational conditions may shape how teachers experience and respond to these demands.

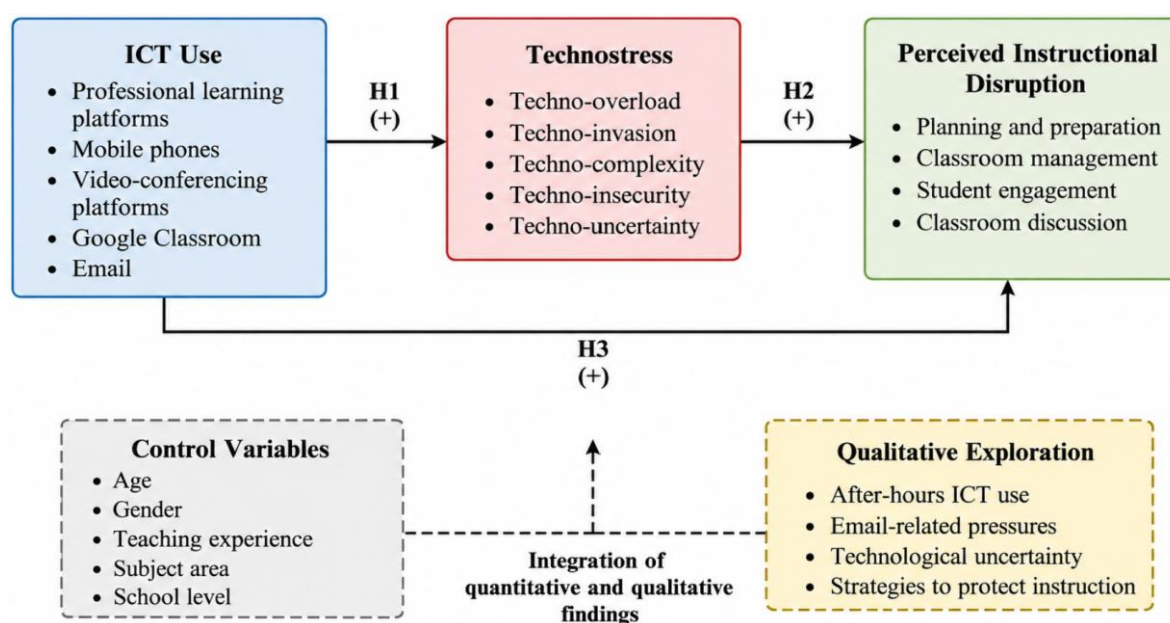


Figure 1. Conceptual relationship among ICT use, technostress, organizational conditions, and perceived instructional disruption among New Generation School teachers.

This study investigates ICT use, technostress, and perceived instructional disruption among New Generation School teachers using an explanatory sequential mixed-methods design. Three research questions guide the study: (i) How much time do New Generation School teachers spend using ICT for professional and non-instructional activities? (ii) How are ICT use and non-instructional technological demands associated with teacher technostress? and (iii) How are ICT use and technostress associated with perceived disruption in planning and preparation, classroom management, student engagement, and classroom discussion? Quantitative survey data are integrated with technology-use logs and semi-structured interviews to identify statistical relationships and explain how technology-related demands are experienced in teachers' everyday professional practice.

2. LITERATURE REVIEW

2.1. ICT Use in Teachers' Professional Practice

Information and communication technology has become an integral component of teachers' professional work. Teachers use digital technologies not only for classroom instruction but also for lesson preparation, assessment, communication, documentation, professional collaboration, and access to educational resources. Consequently, ICT use extends across both instructional and non-instructional activities and increasingly shapes how teachers organize their professional responsibilities. Effective technology integration also depends on teachers' ability to develop, manage, and use digital learning content appropriately within instructional practice (Nafsi and Maryanti, 2022; Ariyanti and Nandiyanto, 2022). However, effective technology integration requires more than frequent technology use. Teachers must be able to connect technological functions with pedagogical purposes, classroom needs, and subject-specific instructional practices (Tondeur et al., 2017). Digital learning materials can also be designed to accommodate diverse learner needs, indicating that the educational value of technology depends not only on its availability but also on accessibility and instructional design (Musayaroh et al., 2023). The increasing digitalization of teachers' work also creates additional responsibilities. Communication platforms, email, learning-management systems, video-conferencing applications, and mobile technologies can increase expectations for rapid responses and continuous availability. Digital technologies may therefore reduce the effort required for some tasks while simultaneously creating new forms of workload, interruption, and professional responsibility (Marsh et al., 2022). This distinction is important because the amount of time spent using ICT cannot by itself indicate whether technology supports or interferes with teaching. Frequent ICT use may represent productive instructional preparation, whereas similar levels of use may reflect administrative burden, repeated communication, technological troubleshooting, or duplicated digital tasks. ICT use should therefore be interpreted in relation to its purpose, timing, and associated professional demands.

2.2. Concept and Dimensions of Technostress

Technostress describes the stress experienced by individuals when technological demands exceed their perceived ability or resources to manage them effectively. The concept has evolved from early concerns about difficulty adapting to computer technologies into a broader framework for understanding the occupational consequences of technology-intensive work (Salazar-Concha et al., 2021). A widely used conceptualization identifies five technostress creators (Tarafdar et al., 2007; Ragu-Nathan et al., 2008).

- (i) Techno-overload refers to situations in which technology increases the amount of work or requires individuals to perform tasks at a faster pace. In teaching, this may occur when educators must simultaneously manage digital communication, instructional platforms, electronic records, assessment systems, and conventional classroom responsibilities.
- (ii) Techno-invasion occurs when technology extends work beyond conventional temporal and spatial boundaries. Mobile devices, email, and online platforms make professional communication accessible outside formal working hours and can create expectations that teachers remain responsive during evenings, weekends, or other personal time (Ragu-Nathan et al., 2008).
- (iii) Techno-complexity describes the perceived difficulty involved in learning, understanding, or operating technological systems. Teachers may experience this

form of technostress when new applications require additional learning, when interfaces are difficult to use, or when technological problems demand skills beyond their existing competence.

- (iv) Techno-insecurity refers to concerns about one's technological competence or professional position relative to individuals who possess stronger digital skills. Rapid technological changes may increase pressure on teachers to continually demonstrate competence with new tools and platforms.
- (v) Techno-uncertainty reflects the instability created by continuous technological updates, changes in digital systems, new platforms, and changing organizational expectations. Frequent technological change may require teachers to repeatedly modify established routines and learn new procedures ([Tarafdar et al., 2007](#); [Ragu-Nathan et al., 2008](#)).

These dimensions demonstrate that technostress is not synonymous with ICT use. Technology use represents exposure to digital tools and tasks, whereas technostress reflects an individual's response to the demands associated with those technologies. The same technological environment may therefore produce different levels of stress depending on workload, competence, organizational support, technical reliability, and professional expectations.

2.3. Technostress in Educational Settings

Although technostress was initially examined primarily in organizational and occupational settings outside education, increasing digitalization has made it an important issue for teachers. School teachers face technological demands that are distinct because their work simultaneously involves instruction, classroom management, assessment, communication, administrative responsibilities, and interaction with multiple stakeholders. Research involving school teachers has demonstrated that technostress can occur when teachers experience difficulties adapting to technological demands or when technology intensifies existing professional pressures. Teacher technostress may be affected by technological competence, workload, age, access to support, institutional expectations, and frequency of technology use ([Estrada-Muñoz et al., 2020](#)). Technology-related stress can also extend beyond the classroom. Digital communication allows administrative requests, student communication, professional collaboration, and instructional preparation to continue after formal working hours. When teachers are unable to separate professional communication from personal time, technology can contribute to techno-invasion and work-life boundary disruption ([Marsh et al., 2022](#)). Its consequences can include psychological strain, anxiety, reduced satisfaction, and changes in occupational performance. Technostress should be examined not only as a technological issue but also as an organizational and professional phenomenon shaped by how technologies are implemented and managed ([Fernandez-Fernandez et al., 2023](#); [Kumar, 2024](#)). However, technology should not be regarded as inherently stressful. ICT can provide important educational benefits when teachers possess adequate competence, technological systems function reliably, and institutions provide sufficient professional and technical support. Technostress is more likely to develop when technological demands are excessive, unclear, poorly supported, or inconsistent with teachers' available time and resources.

2.4. Technostress, Digital Workload, and Professional Boundaries

Digital workload provides an important mechanism for understanding how ICT use can develop into technostress. Teachers may need to manage multiple digital channels

simultaneously, including email, mobile communication, learning platforms, video-conferencing systems, and professional collaboration applications. Although each activity may appear manageable independently, their combined demands can create fragmented attention and an ongoing sense of unfinished work. Continuous digital connectivity may be particularly important because it reduces the boundary between working and non-working time. Teachers can receive work-related information at almost any time and may feel pressure to monitor or respond to digital communication beyond contractual hours. This condition closely reflects the concept of techno-invasion and can contribute to difficulties disengaging from work (Ragu-Nathan et al., 2008; Harris et al., 2022). Digital workload may also contribute to techno-overload when technological systems increase rather than reduce the number of professional tasks. For example, teachers may prepare instructional materials digitally while also maintaining conventional records, respond to multiple communication channels, or repeatedly update similar information across different platforms. Under these circumstances, technology can become an additional layer of work rather than simply a tool for increasing efficiency. The consequences of digital workload depend partly on organizational practice. Clear communication expectations, streamlined platforms, accessible technical assistance, and appropriate professional development may reduce unnecessary technological demands. In contrast, poorly coordinated technological requirements can increase uncertainty, duplication, and perceived workload.

2.5. From Technostress to Instructional Disruption

The educational importance of technostress becomes particularly evident when technological demands interfere with teachers' core instructional responsibilities. The present study focuses on four aspects of instructional practice: planning and preparation, classroom management, student engagement, and classroom discussion. These domains are consistent with broader frameworks that conceptualize teaching as a combination of preparation, classroom environment, instruction, and professional responsibilities. Planning and preparation may be disrupted when digital communication, administrative requirements, or technological troubleshooting consume time that would otherwise be allocated to lesson development. Teachers may also need to modify instructional materials repeatedly when technological platforms change or when classroom technology does not operate as expected. Classroom management may be affected when teachers must simultaneously supervise learners and resolve technological problems. Unexpected system failures, connectivity problems, or unfamiliar digital interfaces can divide teachers' attention and interrupt the planned sequence of classroom activities. Student engagement may also be affected when technological problems interrupt lesson flow or require teachers to shift their attention away from learners. However, ICT itself does not necessarily reduce engagement. Technology can enhance instructional interaction when it is purposefully integrated, whereas disruption is more likely when technological demands interfere with rather than support instructional goals. Similarly, classroom discussion can be affected when technological interruptions reduce instructional continuity or when teachers devote attention to digital management rather than interaction with students. The educational consequences of technology depend on the relationship among ICT demands, teachers' responses to those demands, and the context in which technology is used. The Framework for Teaching provides a useful basis for interpreting these relationships because instructional practice cannot be reduced to a single measure of teacher effectiveness. Examining specific instructional activities makes it possible to identify where technology-related demands are most strongly associated with perceived disruption.

2.6. Organizational Conditions and Teacher Responses

Technostress does not arise solely from individual technological competence. Organizational practices can influence whether teachers experience ICT as supportive or burdensome. Availability of technical support, clarity of communication policies, platform reliability, professional development, workload allocation, and expectations regarding after-hours communication can shape teachers' responses to technology. Technostress research distinguishes between technological stressors and factors that may inhibit or reduce their effects. Organizational support, technological assistance, training, and opportunities for involvement in technological implementation can help users respond more effectively to technology-related demands (Ragu-Nathan *et al.*, 2008). Teachers can also employ individual strategies to reduce technological disruption. These may include limiting after-hours communication, prioritizing instructional tasks, establishing digital boundaries, developing alternative lesson plans, and separating urgent from non-urgent technological demands. The relationship between technostress and instructional disruption is not necessarily deterministic. The interaction between organizational conditions and teacher responses is therefore important. The same technological demand may be manageable when expectations are clear and support is available but may become stressful when teachers lack resources, time, or control over technological requirements.

3. METHODS

3.1. Research Design

This study employed an explanatory sequential mixed-methods design grounded in a pragmatic research orientation. The design was selected because the study sought not only to identify statistical relationships among ICT use, technostress, and perceived instructional disruption, but also to explain how these relationships were experienced in teachers' daily professional practice. In explanatory sequential mixed methods, quantitative data are collected and analyzed first, followed by qualitative data that help interpret, clarify, or elaborate the quantitative findings (Schoonenboom and Johnson, 2017). The study was conducted in two consecutive phases. Phase I involved quantitative data collection using an electronic survey measuring ICT use, technostress, and perceived disruption of instructional activities. Phase II involved a nested subset of participants who completed technology-use logs for 14 consecutive days and subsequently participated in semi-structured interviews. The qualitative phase was used to provide contextual explanation and triangulate the quantitative findings rather than function as an independent qualitative investigation. The research procedure is summarized in **Figure 2**. The design begins with quantitative measurement, proceeds to qualitative follow-up, and concludes with integration of both forms of evidence during interpretation.

3.2. Participants and Sampling

The quantitative phase involved 118 secondary-school teachers working in New Generation Schools. Because some survey items contained missing responses, the number of valid cases varied slightly across analyses; inferential statistics were calculated using available valid responses for each analysis. Participants were recruited through direct electronic communication and school-related announcements. The sampling process was intended to include teachers with variation in age, years of teaching experience, school location, and grade level taught. At the end of Phase I, participants were invited to volunteer for the

qualitative follow-up. The initial study design anticipated a nested sample of 20 participants. Eighteen teachers volunteered to participate in the second phase, but only five participants completed both the 14-day technology-use log and the follow-up interview. The Phase II sample was therefore treated as an explanatory qualitative subset rather than as a statistically representative sample of the full quantitative population. Its purpose was to provide detailed contextual evidence concerning teachers' experiences with ICT use, technostress, and instructional disruption.

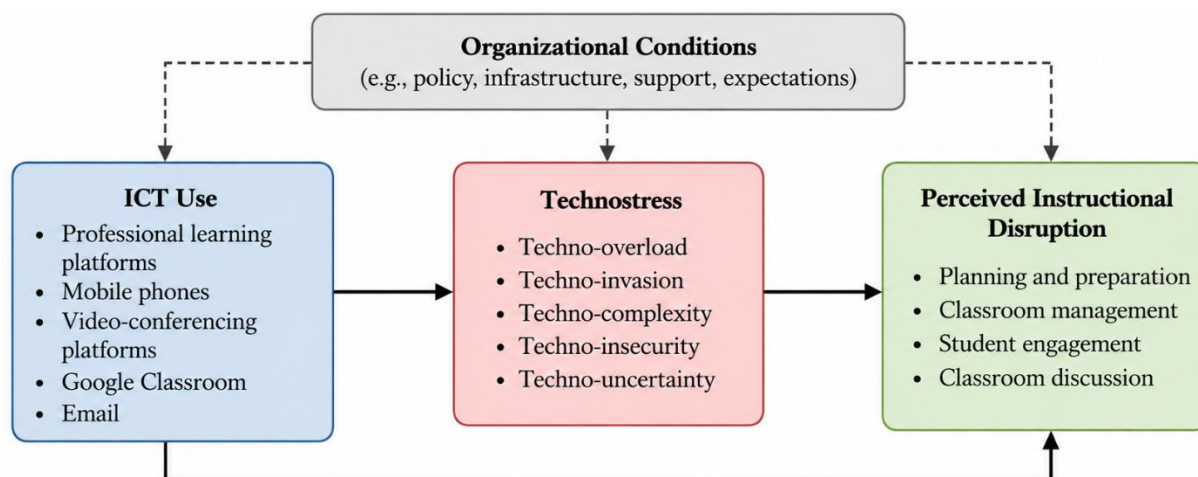


Figure 2. Explanatory sequential mixed-methods design used to examine ICT use, technostress, and perceived instructional disruption.

3.3. Research Instruments and Data Collection

The study used four complementary instruments: a standardized technostress questionnaire, survey items, structured technology-use logs, and semi-structured interviews. These instruments were selected to capture both measurable patterns and contextual explanations of teachers' technology-related experiences. The combination of standardized and researcher-developed instruments allowed the study to examine technostress as a multidimensional construct while also measuring teachers' ICT-use patterns and perceived interference with instructional activities. Qualitative logs and interviews were then used to explain how these experiences developed in everyday professional practice. The research instruments, their methodological roles, and the procedures used to support reliability and validity are summarized in **Table 1**. Methodological quality was supported through internal consistency assessment for the technostress instrument, pilot testing of the survey items, standardized prompts for the technology logs, and structured procedures for the interview protocol.

3.3.1. Phase I: Quantitative Survey

Phase I used an electronic survey consisting of the 41-item Technostress Questionnaire and 22 items examining ICT use and its perceived effects on instructional practice. The technostress instrument assessed the major dimensions of techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty. Responses were recorded using a five-point Likert scale ranging from strong disagreement to strong agreement, with an additional non-applicable option where appropriate. The section examined ICT use across five principal categories: email, mobile-phone use, class or course platforms, video-conferencing platforms, and professional learning or collaboration platforms. Participants reported the

amount of time spent using these technologies and evaluated the extent to which ICT-related demands affected selected areas of instructional practice. These areas included planning and preparation, classroom management, student engagement, and classroom discussion. ICT-use time was collected using categorical response ranges, including < 1 h, 1-2 h, 3-4 h, and > 5 h per week. The survey also collected demographic information related to age group, school setting, years of teaching experience, and grade level taught.

Table 1. Summary of research instruments, type, reliability, and validity.

RESEARCH INSTRUMENT	TYPE	RELIABILITY	VALIDITY
Technostress Questionnaire	Quantitative	High internal consistency across dimensions; Cronbach's $\alpha = 0.71-0.91$	Validity established in previous technostress research
Survey items	Quantitative	Pilot test with six participants; Cronbach's $\alpha = 0.88$	Expert review for content, clarity, and coherence
Technology-use log	Qualitative	Standardized prompts across participants	Expert review and convergence with survey and interview data
Semi-structured interview protocol	Qualitative	Consistent interview procedures and follow-up probes	Expert review and participant-based verification procedures

3.3.2. Phase II: Technology-Use Logs

Participants entering Phase II were asked to maintain a technology-use log for 14 consecutive days. The logs recorded the types of ICT used, the timing of technology use, and participants' perceptions of whether particular technological activities increased stress or interfered with instructional responsibilities. The log structure corresponded to the same general technological categories examined in the survey. Participants were also given opportunities to provide qualitative reflections on their experiences. These responses were intended to capture day-to-day patterns that could not be fully represented through the cross-sectional survey. Particular attention was given to whether ICT use occurred during or beyond formal working hours and whether technological demands were associated with planning and preparation, classroom management, student engagement, or classroom discussion. The technology logs therefore served as an important intermediate source of evidence between the quantitative survey and the qualitative interviews.

3.3.3. Semi-Structured Interviews

After completing the technology-use logs, participants took part in semi-structured interviews conducted through Zoom. Interviews were recorded for transcription and subsequently analyzed using qualitative coding procedures. The interview protocol consisted of 20 open-ended questions with follow-up probes. Questions focused on ICT-use patterns, experiences of technostress, perceived disruption to instructional practice, professional communication demands, technological uncertainty, and participants' strategies for managing technology-related pressures. The interview phase was designed to clarify quantitative relationships identified during Phase I. Rather than merely repeating survey items, interviews explored why particular technological activities became stressful and how teachers attempted to maintain instructional continuity when confronted with ICT-related demands.

3.4. Quantitative Data Analysis

Quantitative data were analyzed using descriptive and inferential statistical procedures. Descriptive statistics were used to summarize ICT-use patterns, technostress scores, and perceived instructional disruption. Means, standard deviations, frequencies, and percentages were calculated where appropriate. To examine teachers' overall ICT use, estimated weekly time was calculated from the reported categorical ranges. One-sample *t*-tests were then used to compare average weekly ICT use with predefined benchmark values. The relationship between ICT use and technostress was examined using Pearson correlation analysis. The association between technostress, ICT use, and instructional disruption was further examined using multivariate and regression procedures. A multivariate analysis of variance was used to assess whether technostress and ICT use were jointly associated with the four instructional domains of planning and preparation, classroom management, student engagement, and classroom discussion. Follow-up regression analyses were then used to examine the individual contribution of ICT use and technostress to each instructional domain. Because instructional outcomes were based on teacher-reported perceptions of interference rather than direct classroom observation or student achievement, statistical relationships were interpreted as associations with perceived instructional disruption rather than direct causal effects on overall instructional effectiveness.

3.5. Qualitative Data Analysis

Qualitative data from technology logs and interview transcripts were analyzed using a multi-cycle coding procedure that combined a priori coding and inductive coding. A priori codes were derived from the main constructs of the study, including ICT use, techno-overload, techno-invasion, techno-complexity, techno-insecurity, techno-uncertainty, and the four instructional domains. Inductive coding was subsequently used to identify additional patterns emerging from participants' descriptions. The qualitative analysis focused particularly on repeated experiences related to after-hours ICT use, communication overload, technological uncertainty, boundary management, technical problems, and perceived interference with instructional practice. Qualitative data were not interpreted as prevalence estimates because the Phase II sample was small. Instead, the purpose of the qualitative analysis was to explain the mechanisms and experiences underlying the quantitative relationships.

3.6. Integration of Quantitative and Qualitative Findings

Integration occurred during the interpretation stage of the mixed-methods process. Quantitative findings first established statistical patterns among ICT use, technostress, and perceived instructional disruption. Technology logs and interviews were then used to clarify how these patterns were experienced in teachers' daily professional practice. Convergence was considered to occur when qualitative evidence supported a quantitative pattern. For example, reported after-hours ICT use could provide contextual explanation for techno-invasion, while repeated communication demands could clarify experiences of techno-overload. Qualitative findings were also used to explain situations in which ICT use and technostress showed different relationships with instructional practice. This distinction was particularly important because high ICT use does not necessarily produce instructional disruption, whereas stress arising from technological demands may be more directly associated with teachers' perceived difficulties in maintaining instructional focus. The mixed-methods integration therefore allowed the study to distinguish between ICT use as a professional activity and technostress as an experienced response to technological demands.

3.7. Ethical Considerations

The study followed principles of voluntary participation, informed consent, confidentiality, and protection of participant information. Participants were informed about the research objectives and procedures before participating. Participation in Phase II was voluntary, and participants provided additional consent for technology-use logs and recorded interviews. Data obtained through surveys, logs, and interviews were handled confidentially, and identifying information was not used in reporting qualitative findings. Appropriate procedures were applied for data storage and participant protection throughout the study. These measures were intended to maintain confidentiality while allowing integration of quantitative and qualitative evidence.

4. RESULTS AND DISCUSSION

4.1. Patterns of ICT Use among New Generation School Teachers

The first analysis examined the amount of time teachers spent using different forms of ICT for professional activities. Five categories were assessed: professional learning platforms, mobile phones, video-conferencing platforms, Google Classroom, and email. These technologies represent different functions of teachers' digital work, including communication, instructional preparation, collaboration, and management of online learning activities. As shown in **Table 2**, email and Google Classroom had the highest mean usage scores among the five ICT categories.

Table 2. Time spent per week using ICT platforms among New Generation School teachers.

ICT CATEGORY	< 1 h	1–2 h	3–4 h	> 5 h	M	SD
Professional learning	71 (68.93%)	22 (21.36%)	9 (8.74%)	1 (0.97%)	0.55	0.90
Phones	71 (69.61%)	13 (12.75%)	15 (14.71%)	3 (2.94%)	0.75	1.35
Video conference	96 (93.20%)	6 (5.83%)	0 (0.00%)	1 (0.97%)	0.12	0.55
Google Classroom	18 (17.65%)	27 (26.47%)	25 (24.51%)	32 (31.37%)	2.60	1.95
Email	3 (2.97%)	33 (32.67%)	41 (40.59%)	24 (23.76%)	2.75	1.55

Note: Percentages were calculated using the number of valid responses for each ICT category; therefore, the denominator varies slightly across categories because of missing responses. Response categories were less than 1 h, 1-2 h, 3-4 h, and more than 5 h per week. Mean weekly ICT-use estimates were calculated using the lower bound of each response interval (<1 h = 0; 1–2 h = 1; 3–4 h = 3; >5 h = 5). *M* = mean; *SD* = standard deviation.

Email produced the highest mean score ($M = 2.75$, $SD = 1.55$), followed by Google Classroom ($M = 2.60$, $SD = 1.95$). In contrast, professional learning platforms, mobile phones, and video-conferencing platforms showed substantially lower mean values. Teachers' ICT engagement was concentrated primarily on communication and classroom-platform activities. The average estimated weekly ICT use was 6.65 hours ($SD = 4.10$). This estimate was significantly higher than a five-hour weekly benchmark, $t(100) = 4.10$, $p < 0.001$, but did not differ significantly from a seven-hour benchmark, $t(100) = -0.89$, $p = 0.374$. The reported pattern indicates that ICT formed a regular component of teachers' professional activities rather than being limited to occasional use. The predominance of email and learning-management platforms is consistent with the changing nature of teachers' work, where digital technologies support both instructional and administrative functions. However, frequent ICT use should not automatically be interpreted as evidence of more effective

technology integration because a substantial proportion of digital activity may consist of communication, reporting, and platform maintenance rather than direct instructional activity (Tondeur et al., 2017; Marsh et al., 2022). The distinction between productive digital engagement and additional digital workload is therefore important when interpreting technology-use intensity.

4.2. ICT Use and Technostress

The second analysis examined the relationship between ICT use and technostress. Teachers reported experiences across the five established technostress dimensions: techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty. These dimensions represent different ways in which digital technologies can increase workload, extend professional responsibilities into personal time, create technological difficulty, generate competence concerns, or require continual adaptation (Tarafdar et al., 2007; Ragu-Nathan et al., 2008). **Table 3** presents teachers' perceived occupational stress associated with different ICT platforms. The overall technostress score was 2.75 ($SD = 0.69$). Platform-specific mean scores were reverse-coded so that higher values indicate lower perceived occupational stress. Pearson correlation analysis showed a weak but statistically significant positive association between estimated weekly ICT use and technostress, $r(99) = 0.20$, $p = 0.047$. Although the relationship was statistically significant, its small magnitude indicates that ICT-use duration accounted for only a limited part of the variation associated with teachers' technostress. This result is theoretically important because technostress depends not only on exposure to technology but also on how technological demands are experienced. Similar levels of ICT use can generate different levels of stress depending on workload, technological complexity, organizational expectations, professional autonomy, and available support (Ragu-Nathan et al., 2008; Kumar, 2024). The finding is also consistent with studies showing that technology-related stress is shaped by the conditions surrounding technology use rather than by technology itself. Digital communication, continuous connectivity, and organizational expectations can transform otherwise useful technologies into sources of techno-overload or techno-invasion when teachers experience difficulty separating professional responsibilities from personal time (Marsh et al., 2022; Harris et al., 2022).

Table 3. Perceived occupational stress associated with ICT platforms among New Generation School teachers.

ICT CATEGORY	1	2	3	4	5	M	SD
Professional learning	24 (22.64%)	42 (39.62%)	30 (28.30%)	7 (6.60%)	3 (2.83%)	3.85	0.93
Phones	24 (22.64%)	25 (23.58%)	43 (40.57%)	10 (9.43%)	4 (3.77%)	3.55	1.10
Video conference	42 (39.62%)	38 (35.85%)	21 (19.81%)	4 (3.77%)	1 (0.94%)	4.15	0.95
Google Classroom	9 (8.49%)	17 (16.04%)	40 (37.74%)	24 (22.64%)	16 (15.09%)	2.91	1.15
Email	4 (3.77%)	17 (16.04%)	40 (37.74%)	23 (21.70%)	22 (20.75%)	2.65	1.20

Note: Response categories were 1 = none, 2 = little, 3 = somewhat, 4 = very much, and 5 = a great deal. Mean scores were reverse-coded so that higher mean values indicate lower perceived occupational stress. *M* = mean; *SD* = standard deviation.

4.3. Technostress and Perceived Instructional Disruption

The third analysis examined whether ICT use and technostress were associated with perceived disruption across four areas of instructional practice: planning and preparation, classroom management, student engagement, and classroom discussion. These domains

represent specific instructional activities rather than a generalized measure of teacher effectiveness. As shown in **Table 4**, teachers reported perceived interference across all four instructional domains, with lower mean scores representing greater perceived disruption.

Table 4. Perceived instructional disruption associated with ICT-related demands.

INSTRUCTIONAL DOMAIN	1	2	3	4	5	M	SD
Planning and preparation	8 (7.77%)	44 (42.72%)	44 (42.72%)	7 (6.80%)	0 (0.00%)	3.55	0.79
Classroom management	17 (16.50%)	37 (35.92%)	22 (21.36%)	27 (26.21%)	0 (0.00%)	3.48	1.13
Student engagement	16 (15.53%)	37 (35.92%)	25 (24.27%)	23 (22.33%)	2 (1.94%)	3.45	0.15*
Classroom discussion	17 (16.50%)	38 (36.89%)	24 (23.30%)	23 (22.33%)	1 (0.97%)	3.51	1.05

Note: Responses were recorded on a five-point scale: 1 = a great deal, 2 = very much, 3 = somewhat, 4 = little, and 5 = none. Higher mean scores therefore indicate lower perceived instructional interference. *M* = mean; *SD* = standard deviation.

The multivariate analysis showed statistically significant effects for both technostress and weekly ICT use. However, the follow-up regression analyses revealed an important difference between these predictors. Both ICT use and technostress were significant predictors of disruption in planning and preparation, whereas technostress alone remained statistically significant for classroom management, student engagement, and classroom discussion. The regression results indicate that technostress was associated with a broader range of instructional-disruption domains than ICT use itself. ICT use may compete directly with preparation time because activities such as email communication, platform management, and administrative digital tasks consume time that could otherwise be allocated to instructional planning. By contrast, technostress may influence a wider range of instructional experiences because stress can affect concentration, attentional control, and teachers' ability to respond flexibly during classroom activity. This interpretation is consistent with earlier research showing that technostress can negatively affect occupational performance and productivity even when technology itself is intended to improve efficiency ([Tarafdar et al., 2007](#); [Fernandez-Fernandez et al., 2023](#)). In educational contexts, this relationship may be especially important because instructional practice requires sustained attention, immediate classroom decision-making, and continuous interaction with students. The results also support the decision to use instructional disruption rather than instructional effectiveness as the principal outcome concept. The study did not directly measure student achievement or independently observed teaching quality; instead, it measured teachers' perceptions of interference with selected instructional activities. This distinction provides a more defensible interpretation of the statistical relationships observed.

4.4. After-Hours ICT Use and Techno-Invasion

The qualitative phase provided additional explanation for the quantitative findings. The first major theme concerned ICT use beyond contractual working hours. Participants reported using ICT during evenings and weekends for email communication, lesson preparation, grading, and development of instructional materials. These experiences provide a direct

qualitative illustration of techno-invasion. Continuous connectivity allows professional demands to extend beyond formal working hours, reducing the separation between work and personal time. The pattern is consistent with technostress research showing that digital connectivity can blur professional boundaries and create continuing expectations of availability (Ragu-Nathan et al., 2008; Harris et al., 2022). The qualitative findings also demonstrate that after-hours ICT use is not always externally imposed. Teachers may voluntarily continue preparation at home because of limited time during the formal school day. Nevertheless, such “voluntary” activity can still reflect structural constraints when workload and scheduling make it difficult to complete essential professional responsibilities during contractual hours. Techno-invasion should not be understood simply as receiving messages outside working hours. It may also emerge when institutional workload encourages teachers to relocate necessary professional tasks into personal time.

4.5. Email as a Source of Techno-Overload

Email emerged as a particularly important source of technological pressure during the qualitative phase. Participants repeatedly associated email with techno-overload and techno-invasion, describing both the volume of communication and the expectation of responsiveness as stressful. This qualitative pattern helps explain why the quantitative results cannot be interpreted solely through total ICT-use duration. A relatively simple technology can become stressful when its organizational demands are high. Email requires little technical expertise, but repeated messages, response expectations, and continuous monitoring can create substantial cognitive and temporal demands. The finding is consistent with broader research on the digital workplace showing that the negative effects of technology often emerge through interruption, information overload, and constant connectivity rather than through technological complexity alone (Marsh et al., 2022). Importantly, one participant reported lower email-related stress when the school consolidated messages into a single communication. This observation highlights the role of organizational design. Technostress may therefore be reduced not only through individual coping strategies but also through changes in communication practices and institutional expectations.

4.6. Technological Uncertainty and Protection of Instructional Practice

The third qualitative theme concerned teachers’ attempts to protect classroom instruction from technological disruption. Participants described deliberate efforts to maintain instructional continuity even when ICT-related demands were present. This pattern provides a possible explanation for why ICT use itself was not a statistically significant predictor of disruption in classroom management, student engagement, or classroom discussion. Technological malfunction represented an important exception. Participants reported that unreliable programs, connectivity problems, or technical failures were particularly stressful because teachers had to simultaneously manage classroom activities and resolve technological problems. These experiences are closely related to techno-uncertainty, in which users face instability and unpredictability in technological systems (Ragu-Nathan et al., 2008). The ability of teachers to establish boundaries and adapt instruction indicates that technological disruption is not deterministic. Teachers can mediate the effects of ICT through preparation, alternative lesson strategies, prioritization, and boundary-setting. This finding is consistent with the broader view that teacher competence and organizational support can reduce the negative consequences of technology-related demands (Tondeur et al., 2017).

4.7. Integrated Interpretation

ICT use, technostress, and instructional disruption are related but conceptually distinct phenomena. ICT use showed a weak positive association with technostress, while technostress showed a broader relationship with perceived instructional disruption than ICT use itself. The findings therefore suggest a progression in which ICT use creates exposure to technological demands, but the educational consequences depend substantially on whether those demands develop into technostress. This interpretation is consistent with established technostress theory, which emphasizes that the negative consequences of technology emerge through overload, invasion, complexity, insecurity, and uncertainty rather than through technology use alone (Tarafdar et al., 2007; Ragu-Nathan et al., 2008). Organizational conditions influence this progression. After-hours communication, email practices, limited preparation time, and technological reliability shaped how teachers experienced digital demands. In contrast, boundary-setting, organizational communication practices, and teachers' adaptive strategies appeared to reduce direct interference with classroom instruction. The central implication of the study is not that greater ICT use necessarily undermines teaching. Instead, technostress represents a more meaningful explanatory mechanism linking technological demands with perceived instructional disruption. This distinction shifts attention from reducing technology use to improving how technology is organized, supported, and incorporated into teachers' professional work.

5. CONCLUSION

ICT use and technostress are related but represent distinct aspects of teachers' digital work with different implications for instructional practice. ICT use was mainly associated with disruption in planning and preparation, whereas technostress was consistently linked to difficulties in classroom management, student engagement, classroom discussion, and preparation. After-hours technology use, email demands, and technological uncertainty contributed to teachers' stress. Reducing perceived instructional disruption therefore requires more than improving teachers' digital skills alone. Schools should clarify communication expectations, provide reliable technical support, protect planning time, streamline digital platforms, and support teachers in managing technology-related workload sustainably in daily practice.

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7. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper is free from plagiarism.

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