



DIGITAL COMMUNICATION PRACTICES, PROFESSIONAL AVAILABILITY AND PERCEIVED TECHNOSTRESS AMONG PRIMARY SCHOOL TEACHERS

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This study explores the structure and characteristics of teachers' digital communication practices and their perceived impact on professional stress. Data was collected from a sample of 131 primary school teachers using a questionnaire addressing online professional communication with colleagues, parents and students, availability outside working hours and perceptions of constant connectivity. Descriptive statistics indicated widespread use of social media and messaging applications for professional purposes, with a high proportion of teachers reporting availability to colleagues, school management, parents and students during weekends. A majority of respondents perceived digital technologies as blurring the boundaries of working time and contributing to increased occupational stress. The findings highlight the complexity of teachers' digital communication practices and point to the need for clearer professional guidelines

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and institutional support aimed at protecting teachers' work–life boundaries in digitally mediated educational environments.

Keywords: *digital communication; teachers' professional practices; work–life boundaries; occupational stress; constant connectivity; technostress*

1. Introduction

The rapid integration of information and communication technologies (ICT) into educational settings has fundamentally reshaped the professional practices of teachers worldwide (Rakisheva & Witt, 2023). Digital platforms and social media have become central communication tools among teachers, parents, colleagues and students, transforming not only pedagogical processes but also the social dynamics of the profession. While digital communication can enhance collaboration and support information sharing, it may also blur professional boundaries and contribute to increased stress and work intensification (Nuutinen & Bordi, 2025). Understanding how teachers utilize digital communication in their work and how this affects their professional well-being has therefore become an important focus in educational research.

Research on digital communication in educational contexts underscores both its potential benefits and challenges. Teachers increasingly use social media and messaging applications to share instructional materials, seek pedagogical advice and maintain professional networks (Chen et al., 2024; Jurić et al., 2026). Such practices can foster collegial support and facilitate the exchange of resources, which may enhance teachers' performance and satisfaction. At the same time, the expanding role of ICT in professional tasks has been linked to phenomena such as technostress, defined as stress experienced due to complexity or constant connectivity associated with technology use (Pagán-Garbín et al., 2024; D. Yang et al., 2025). Research further shows that technostress in education is associated with negative outcomes such as reduced job satisfaction, burnout and diminished work–life boundaries (Pagán-Garbín et al., 2024; Z. Wang et al., 2023).

A growing body of literature has examined the implications of digital communication for teachers' well-being. Teachers' time spent communicating with parents via digital platforms has been linked to both increased

self-efficacy and elevated stress, particularly when not supported by professional development opportunities (H. Yang et al., 2025). Empirical research also shows that digital school–home communication can support parent–teacher collaboration but may simultaneously increase workload and extend work beyond formal hours (Kuusimäki et al., 2019). At the same time, the expanding role of information and communication technologies has been associated with technostress in educational contexts, as documented in systematic reviews of recent research (D. Yang et al., 2025). Studies also demonstrate that technostress is positively correlated with work–family conflict and health issues for teachers (Z. Wang et al., 2023) and that extensive work-related social media exposure can contribute to teacher burnout, partly mediated by blurred boundaries between professional and personal time (Wu et al., 2025).

The concept of work-life balance in teaching is closely tied to technology use. As ICT becomes embedded in planning, instruction, assessment and communication tasks, teachers report increased workloads and difficulty maintaining boundaries between professional and personal life (Z. Wang et al., 2023). Teachers' use of digital platforms after formal hours for tasks such as responding to parent messages or coordinating instructional activities reflects broader trends of work-related ICT use outside of scheduled working time, which can have mixed effects on teachers' well-being depending on individual preferences and institutional norms (Wu et al., 2025). While technology can streamline workflow and enhance accessibility to resources, it also invites continuous expectations of availability, contributing to stress and burnout in the absence of organizational support (Nuutinen & Bordi, 2025; Wu et al., 2025).

The stress associated with digital work demands has been amplified by broader shifts in education, particularly in the context of the COVID-19 pandemic. Studies conducted during the pandemic highlight that remote and hybrid teaching increased teachers' professional roles and workload perceptions (Kim & Asbury, 2020). Although some research identifies positive aspects of technology use, such as cognitive engagement and efficiency gains, the cumulative and persistent demands associated with digital communication can exacerbate teacher stress when left unmanaged (Z. Wang et al., 2023).

The existing literature also highlights the dual nature of digital technologies in educational work. On one hand, social media platforms

and messaging apps can support professional learning communities and facilitate peer support, which enhance teacher satisfaction and reduce isolation (Kuusimäki et al., 2019). On the other hand, constant digital connectivity can contribute to technological intrusion and resource depletion, where teachers invest time and emotional energy in responding to work demands during non-work hours, thereby magnifying work-to-family conflict and reducing opportunities for recovery (Z. Wang et al., 2023). These mechanisms align with frameworks such as the Conservation of Resources (COR) theory, which posits that sustained demands on personal resources, such as time and attention, can contribute to stress and burnout (Hobfoll et al., 2018).

Differential patterns in digital communication practices may reflect variations in teachers' roles and contexts. For example, digital communication with students, parents and other educational stakeholders often involves distinct purposes, norms and professional responsibilities that vary by group, shaping how interactions are enacted and interpreted in school communities (Lundtofte & Grønning, 2024; Lutovac et al., 2024). These variations matter for understanding how digital communication contributes to workload and stress, given that expectations and norms around communication differ significantly across stakeholder groups and modes of interaction. Messaging applications and online platforms used to connect teachers with parents have been shown to create both opportunities for engagement and challenges related to time demands and boundary management within teachers' work lives (Petrova & Belyakova, 2024; Khoo et al., 2024).

Despite extensive research on digital communication in education, gaps remain concerning how teachers' use of social media and messaging technologies relates to their professional availability and perceived stress outside of traditional working hours. There is a need for exploratory studies that parse specific dimensions of digital communication practices – including frequency of use, professional collaboration, parent engagement and perceived intrusion – and examine how these dimensions cluster empirically. Such research can illuminate latent constructs of digital professional behavior and inform interventions aimed at supporting teachers' well-being in increasingly connected educational environments.

Despite the growing body of research on ICT use in education, less attention has been paid to how specific forms of digital communication

contribute to teachers' perceived stress through the expansion of professional availability beyond working hours. In particular, it remains unclear whether and to what extent teachers attribute their experienced occupational stress to constant digital connectivity and communication demands, as opposed to general workload factors. Furthermore, existing studies rarely examine the structural dimensions of digital communication practices in relation to different communication partners, such as colleagues, parents and students.

Therefore, this study seeks to address this gap by examining (i) the underlying dimensions of teachers' digital communication practices, (ii) patterns of professional availability outside formal working hours, and (iii) teachers' perceptions of stress specifically associated with constant digital connectivity.

2. Research questions

This study aims to explore teachers' digital communication practices and their perceived impact on professional availability and occupational stress. Specifically, the study addresses the following research questions:

- RQ1: What are the main dimensions underlying teachers' digital communication practices?
- RQ2: To what extent are teachers professionally available outside formal working hours through digital communication channels?
- RQ3: How do teachers perceive the effects of constant digital connectivity on work–life boundaries and occupational stress specifically associated with digital communication demands?

3. Methodology

3.1. Participants

The study employed a cross-sectional research design using a convenience sample of 131 primary school teachers who completed the survey between April and May 2024. Participants were identified and invited through professional networks and teacher associations, ensuring a diverse representation of teaching experience, school types and

subject areas. The inclusion criterion required active engagement in teaching during the school year at the time of data collection. With respect to demographic characteristics, the sample was largely composed of female participants (93.9%), slightly higher than the national average for Croatia (85%) (Croatian Bureau of Statistics, 2025). Participants’ age ranged from 21 to over 60 years, with a mean age of 43.44 years (SD = 10.04). The most represented age groups were 31–40 and 41–50 years, each comprising 31.1% of the sample. Regarding professional experience, respondents reported an average of 17.03 years of teaching service (SD = 9.94), with the largest proportion (37.4%) indicating between 11 and 20 years of experience.

Table 1. Demographic characteristics of the sample (N = 131)

Variable	Category	n	%
Gender	Female	123	93.9
	Male	8	6.1
Age	21–30	13	9.9
	31–40	41	31.3
	41–50	41	31.3
	51–60	32	24.4
	60+	4	3.1
Years of teaching experience	0–10	36	27.5
	11–20	49	37.4
	21–30	29	22.1
	31+	17	13.0
Mean age (SD)		43.44	(10.04)
Mean years of experience (SD)		17.03	(9.94)

3.2. Instrument

The questionnaire was developed by the authors of this study to assess teachers’ digital communication practices, professional availability outside formal working hours and perceived stress related to constant connectivity. The instrument was designed based on a review of relevant

literature on technostress, ICT use in education and teacher work–life balance. No previously validated scale was directly adopted; however, item formulation was informed by prior research findings in the field. Data was collected using a structured self-report questionnaire developed in Google Forms. The questionnaire comprised of 14 items covering three conceptual domains: (1) digital collaboration within teacher communities, (2) professional availability outside working hours, and (3) perceived effects of constant connectivity on work-life boundaries and stress. Items were rated on a combination of dichotomous (0 = No, 1 = Yes) and Likert-type scales (1 = Never to 5 = Always), depending on the item content.

3.3. Procedure

The questionnaire was distributed online using survey software Google Forms. Participation was voluntary and informed consent was obtained from all respondents. Anonymity was maintained throughout data collection and participants were informed of their right to withdraw at any time. Data collection occurred over a four-week period and the final dataset contained no missing values for any of the 14 items, indicating high completion rates.

3.4. Data Analysis

Descriptive statistics, including arithmetic means, standard deviations and frequency distributions were calculated for each item to provide an overview of digital communication behaviors and perceived stress among teachers. Exploratory Factor Analysis (EFA) was conducted to identify the latent structure underlying teachers' digital communication practices. Prior to EFA, the suitability of the dataset was assessed using the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity. The overall KMO value of 0.588 indicated acceptable sampling adequacy, while Bartlett's test ($\chi^2(91) = 442.712$, $p < .001$) confirmed sufficient correlations among items for factor analysis.

EFA was performed using principal axis factoring with promax rotation to allow for correlated factors. Promax rotation was chosen

because correlations between factors were expected given the conceptual overlap between different forms of digital communication. Factor retention was guided by eigenvalues greater than 1 and inspection of the scree plot. Factor loadings above 0.40 were considered indicative of meaningful item-factor relationships and items with high uniqueness (>0.70) were evaluated for potential exclusion. Three factors were retained, representing (1) teacher collaboration within social media groups, (2) professional availability outside working hours, and (3) communication with students via messaging applications.

The internal consistency of the resulting scale and subscales was assessed using Cronbach's alpha. The overall alpha coefficient was 0.687, indicating acceptable reliability for exploratory research. Analyses were conducted using statistical analysis software JASP 0.95.4 and all assumptions for EFA were systematically evaluated to ensure the robustness of the factor structure.

4. Results

A total of 131 teachers participated in the study. The results indicate a high prevalence of digital communication practices, particularly in relation to messaging applications and weekend availability.

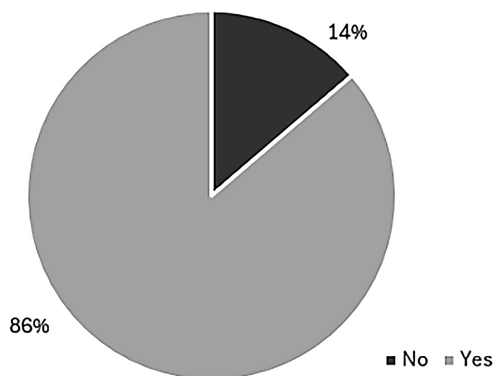


Figure 1. I have a Facebook profile and participate in one or more teacher groups.

Figure 1 presents that regarding social media use, the majority of respondents (n = 113; 86.3%) reported having a Facebook profile and participating in one or more teacher groups, while 18 participants (13.7%) indicated that they did not.

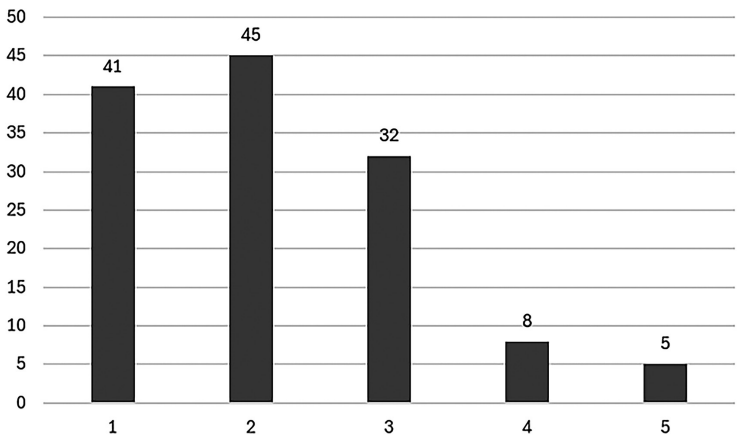


Figure 2. I share my teaching materials with colleagues in teacher groups on social media.

With respect to active engagement in teacher groups (Figure 2), responses suggest relatively moderate to low levels of contribution. Concerning the sharing of teaching materials, 41 teachers (31.3%) reported that they never share materials, 45 teachers (34.4%) indicated that they rarely share them, 32 teachers (24.4%) stated that they sometimes share them, 8 teachers (6.1%) reported that they often share them and 5 teachers (3.8%) indicated that they always share teaching materials. This distribution indicates that most teachers share materials rarely or occasionally, while only a small proportion report frequent sharing.

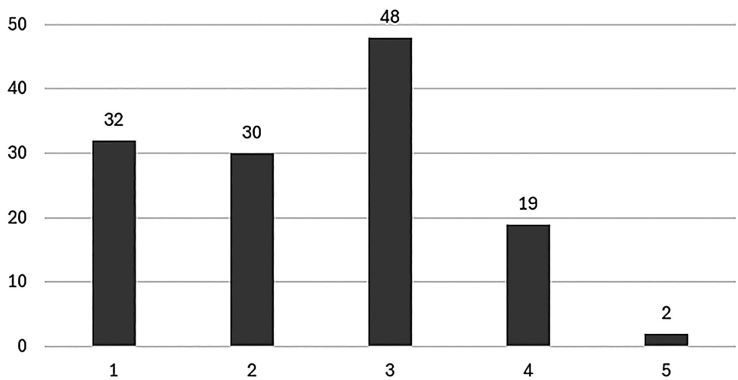


Figure 3. I download teaching materials created and shared by my colleagues in teacher groups on social media.

Similarly, for downloading teaching materials shared by colleagues (Figure 3), 32 teachers (24.4%) reported that they never download such materials, 30 teachers (22.9%) indicated that they rarely do so, 48 teachers (36.6%) stated that they sometimes download them, 19 teachers (14.5%) reported that they often download them and 2 teachers (1.5%) indicated that they always download teaching materials shared by colleagues. The highest concentration of responses was in the middle category, suggesting occasional downloading of shared materials rather than systematic or frequent use.

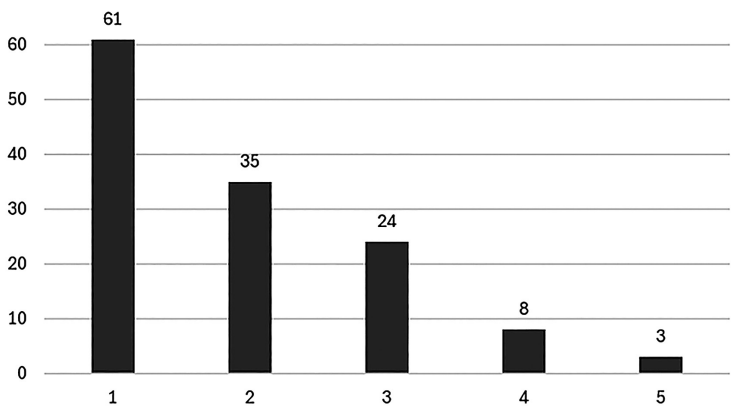


Figure 4. If I have a dilemma or a problem in working with children, I seek help and advice from colleagues in teacher groups on social media.

When asked whether they seek help and advice in teacher groups when facing dilemmas in working with children (Figure 4), 61 teachers (46.6%) reported that they never seek such assistance and 35 (26.7%) indicated that they rarely do so, suggesting that a majority seldom turn to online teacher groups for support. Smaller proportions reported that they sometimes ($n = 24$; 18.3%), often ($n = 8$; 6.1%) or always ($n = 3$; 2.3%) use teacher groups for professional problem-solving.

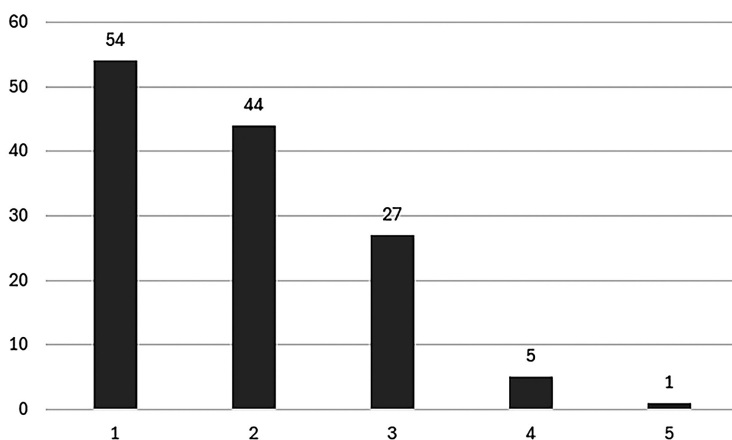


Figure 5. I comment on my colleagues' posts on social media.

Commenting on colleagues' posts (Figure 5) also appeared infrequent: 54 teachers (41.2%) reported that they never comment on such posts and 44 teachers (33.6%) indicated that they rarely do so. Only 27 teachers (20.6%) stated that they sometimes comment, while 5 teachers (3.8%) reported that they often comment and 1 teacher (0.7%) indicated that they always do so. These findings suggest that although teachers are present in online professional communities, active interaction remains limited.

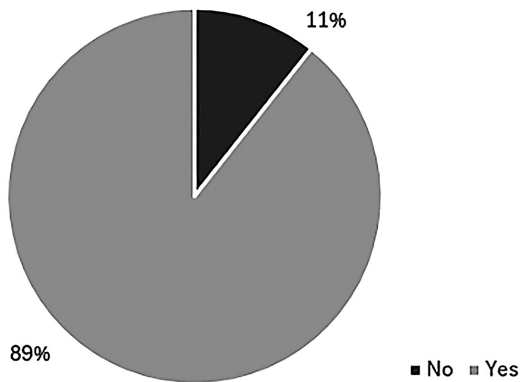


Figure 6. I communicate with colleagues from my school within a closed Viber or WhatsApp group.

As it is visible from data presented in Figure 6, communication through messaging applications was highly prevalent. A large majority of teachers ($n = 117$; 89.3%) reported communicating with colleagues from their school within closed Viber or WhatsApp groups, while only 14 teachers (10.7%) reported not using such groups.

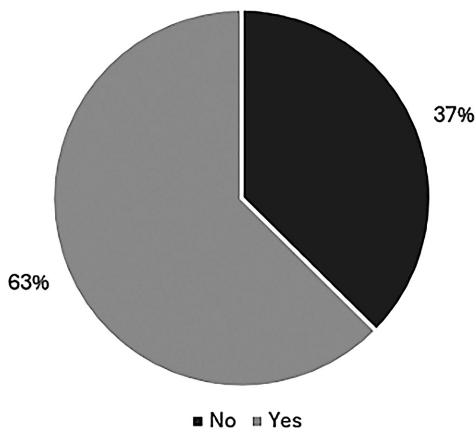


Figure 7. I communicate with my students' parents within a closed Viber or WhatsApp group.

Communication with parents via closed messaging groups (Figure 7) was also common ($n = 82$; 62.6%), although 49 teachers (37.4%) reported not engaging in this form of communication.

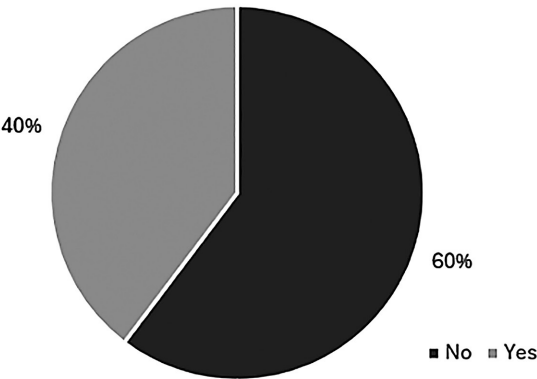


Figure 8. I communicate with students within a closed Viber or WhatsApp group.

Communication with students within closed messaging groups (Figure 8) was less frequent. While 52 teachers (39.7%) reported such communication, a larger proportion ($n = 79$; 60.3%) indicated that they do not communicate with students in this manner.

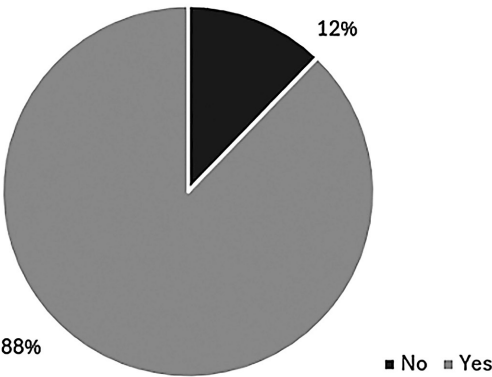


Figure 9. I respond to a call or message from the principal during the weekend.

It is evident from data presented in Figure 9 that weekend availability was notably high. Most respondents reported responding to calls or messages from the principal during the weekend ($n = 115$; 87.8%), with only 16 teachers (12.2%) indicating that they do not.

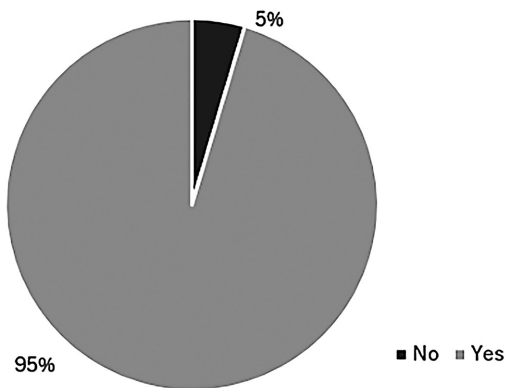


Figure 10. I respond to a call or message from a colleague during the weekend.

Figure 10 presents data that an even higher proportion reported responding to colleagues during weekends ($n = 125$; 95.4%), with only 6 teachers (4.6%) indicating otherwise.

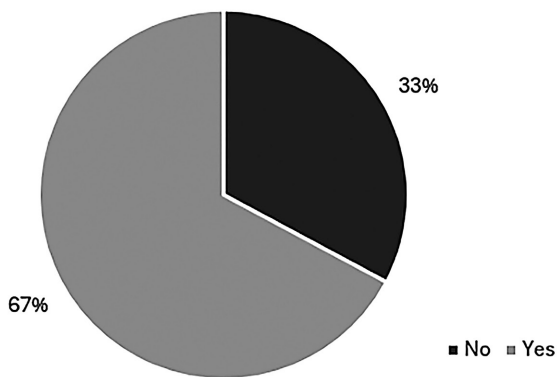


Figure 11. I respond to a call or message from my students' parents during the weekend.

Communication with parents during weekends (Figure 11) was reported by 88 teachers (67.2%), while 43 teachers (32.8%) indicated that they do not respond during this time.

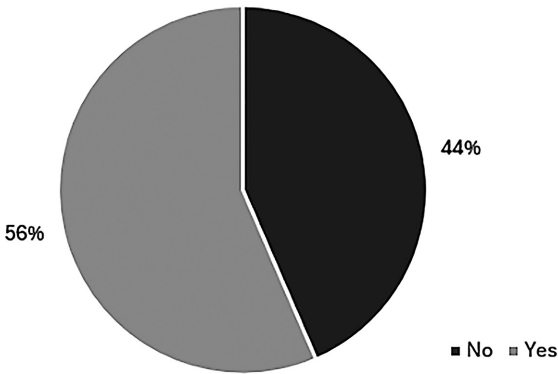


Figure 12. I respond to a call or message from a student during the weekend.

Similarly, data in Figure 12 presents that 74 teachers (56.5%) reported responding to students during weekends, whereas 57 teachers (43.5%) do not.

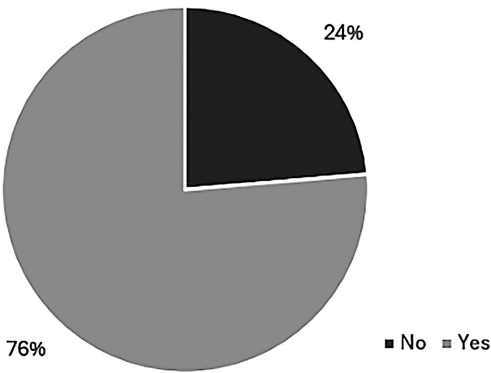


Figure 13. I believe that due to the advancement of digital technology, my working hours never truly end.

Perceptions of digital technology's impact on work boundaries (Figure 13) revealed that a substantial majority of teachers ($n = 100$; 76.3%) believe that due to the advancement of digital technology their working hours never truly end, while 31 teachers (23.7%) disagreed.

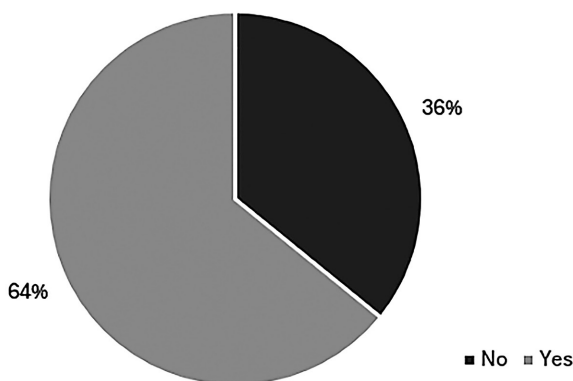


Figure 14. The fact that the principal, colleagues, students and parents can always contact me increases the level of stress in my job.

Furthermore, 84 teachers (64.1%) agreed that the constant possibility of being contacted by principals, colleagues, students and parents increases the level of stress in their job (Figure 14), whereas 47 teachers (35.9%) did not perceive such an increase in stress.

Overall, the findings indicate that while teachers' active engagement in social media-based professional collaboration is relatively moderate, the use of messaging applications for communication and responsiveness outside formal working hours is widespread. Additionally, a considerable proportion of teachers perceive continuous digital availability as contributing to extended working hours and increased occupational stress. These findings highlight the perceived blurring of professional boundaries and the psychological impact of persistent connectivity.

4.1. Exploratory factor analysis

To investigate the underlying structure of teachers' digital communication practices, exploratory factor analysis (EFA) was performed.

Prior to analysis, the suitability of the data was assessed. Bartlett's test of sphericity was statistically significant ($\chi^2(91) = 442.712$, $p < .001$), indicating sufficient correlations among items to warrant factor analysis. Although the Kaiser–Meyer–Olkin (KMO) value was modest (0.588), it exceeded the minimum threshold of 0.50 recommended for exploratory factor analysis in social science research. Individual MSA values ranged from 0.367 to 0.759, with items related to teacher collaboration in social media groups demonstrating higher sampling adequacy and items assessing communication with students showing lower adequacy.

EFA was conducted using principal axis factoring with promax rotation, allowing factors to correlate. Three factors were retained based on eigenvalues greater than 1 and visual inspection of the scree plot. The rotated solution explained 36.0% of the cumulative variance.

Table 2. Results of factor analysis

<i>Factor Loadings</i>				
	Factor 1	Factor 2	Factor 3	Uniqueness
4. If I have a dilemma or a problem in working with children, I seek help and advice from colleagues in teacher groups on social media.	0.780			0.386
5. I comment on my colleagues' posts on social media.	0.739			0.437
2. I share my teaching materials with colleagues in teacher groups on social media.	0.691			0.526w
3. I download teaching materials created and shared by my colleagues in teacher groups on social media.	0.604			0.555
1. I have a Facebook profile and participate in one or more teacher groups.	0.412			0.821

<i>Factor Loadings</i>				
	Factor 1	Factor 2	Factor 3	Uniqueness
11. I respond to a call or message from my students' parents during the weekend.		0.663		0.430
9. I respond to a call or message from the principal during the weekend.		0.626		0.612
10. I respond to a call or message from a colleague during the weekend.		0.558		0.670
7. I communicate with my students' parents within a closed Viber or WhatsApp group.		0.443		0.803
12. I respond to a call or message from a student during the weekend.			0.797	0.372
8. I communicate with students within a closed Viber or WhatsApp group.			0.525	0.722
13. I believe that due to the advancement of digital technology, my working hours never truly end.				0.855
14. The fact that the principal, colleagues, students and parents can always contact me increases the level of stress in my job.				0.917
6. I communicate with colleagues from my school within a closed Viber or WhatsApp group.				0.857

Factor 1, labeled “Teacher Collaboration in Social Media Groups,” included items assessing participation in teacher-focused social media groups, sharing and downloading instructional materials, commenting on colleagues’ posts and seeking advice online. Factor loadings for this factor ranged from 0.412 to 0.780, indicating moderate to strong rela-

tionships between items and the underlying factor. Uniqueness values for these items ranged from 0.386 to 0.821, suggesting that the factor captured a substantial proportion of item variance, though some items (e.g., social media group membership) retained higher uniqueness.

Factor 2, labeled “Professional Availability Beyond Working Hours,” encompassed items related to responding to calls or messages from colleagues, principals and parents during weekends, as well as communication with parents in closed messaging groups. Factor loadings ranged from 0.443 to 0.663, with uniqueness values between 0.430 and 0.803. This factor reflected the expectation of teachers’ availability outside formal working hours and their engagement in professional communication during non-work periods.

Factor 3, labeled “Communication with students via messaging applications” included items assessing teachers’ communication with students in messaging groups and responding to students’ calls or messages during weekends. Factor loadings for this factor ranged from 0.525 to 0.797, with uniqueness values from 0.372 to 0.722. This factor reflects the extent to which teachers engage in direct digital communication with students through messaging platforms and remain responsive to student contact outside regular working hours.

The unrotated solution indicated eigenvalues of 2.379, 1.562, and 1.097 for Factors 1, 2 and 3, respectively, accounting for 36.0% of total variance cumulatively. After rotation, the sum of squared loadings suggested that Factor 1 accounted for 15.8% of variance, Factor 2 for 11.5%, and Factor 3 for 8.7%.

Table 3. Correlation analysis

<i>Factor Correlations</i>			
	Factor 1	Factor 2	Factor 3
Factor 1	1.000	0.130	0.216
Factor 2	0.130	1.000	0.020
Factor 3	0.216	0.020	1.000

The correlation analysis indicates that all relationships between the identified factors are weak, suggesting that the dimensions represent

relatively distinct aspects of teachers’ digital communication practices. A weak positive correlation was observed between Factor 1 and Factor 2 ($r = 0.130$), indicating that teachers who are more active in collaboration within social media groups tend to be only slightly more available for professional communication outside working hours. The correlation between Factor 1 and Factor 3 ($r = 0.216$) is also weak but somewhat higher, suggesting that greater participation in online teacher communities may be modestly associated with communication with students through messaging applications. In contrast, the relationship between Factor 2 and Factor 3 is almost nonexistent ($r = 0.020$), indicating that professional availability outside working hours is largely independent of teachers’ direct digital communication with students. Overall, the low correlations support the conceptual distinction between the three identified factors.

The results of the exploratory factor analysis directly address RQ1 by identifying three distinct dimensions underlying teachers’ digital communication practices: (1) collaboration in social media groups, (2) professional availability beyond working hours, and (3) communication with students.

4.2. Reliability analysis

The internal consistency of the scale was evaluated using Cronbach’s alpha. The overall scale demonstrated moderate reliability ($\alpha = 0.687$), which is considered acceptable for exploratory research, particularly given the multidimensional nature of the construct. These results indicate that while the scale captures meaningful dimensions of digital communication practices, some items may benefit from refinement in future research.

Table 4. Reliability analysis by factors

Factor	Cronbach α
Factor 1	0.766
Factor 2	0.613
Factor 3	0.630

Factor 1, representing “*Teacher collaboration in social media groups*”, demonstrated the highest level of internal consistency ($\alpha = 0.766$), indicating good reliability and suggesting that the items associated with this factor measure a relatively coherent construct.

Factor 2, labeled “*Professional availability beyond working hours*”, showed a Cronbach’s alpha of 0.613, reflecting moderate internal consistency. Similarly, Factor 3, “*Communication with students via messaging applications*”, yielded an alpha coefficient of 0.630, which also indicates acceptable reliability for exploratory research.

Although the reliability values for Factors 2 and 3 are somewhat lower than the conventional threshold of 0.70, such values are generally considered acceptable in exploratory studies and newly developed scales, particularly when the number of items per factor is limited. Overall, these results suggest that the identified factors demonstrate sufficient internal consistency to support further analysis and interpretation.

5. Discussion

This study aimed to explore teachers’ digital communication practices, their professional availability outside formal working hours and the perceived impact of technology on work-life boundaries and occupational stress. Using a combination of descriptive statistics, frequency analyses and exploratory factor analysis (EFA), three dimensions of teacher digital engagement were identified: (1) collaboration within teacher-focused social media groups, (2) professional availability beyond working hours and (3) communication with students. The findings contribute to understanding the multifaceted role of digital technology in contemporary teaching contexts and align with recent research on technostress, digital collaboration and teacher well-being.

5.1. Digital collaboration in social media groups

The first factor, “Teacher collaboration in social media groups,” captured behaviors related to sharing and downloading instructional materials, commenting on colleagues’ posts and seeking professional advice through online teacher communities. Although the majority of

teachers maintained a presence in these groups (86.3% had Facebook profiles and were members of one or more teacher groups), active engagement was limited. Less than 10% of participants reported sharing materials or providing feedback “often” or “always,” suggesting that membership does not necessarily translate into meaningful collaboration.

This discrepancy suggests that visibility and access do not necessarily translate into sustained or meaningful professional collaboration. Prior research on online teacher communities and professional learning networks similarly indicates that while digital platforms expand access to resources and peer interaction, participation tends to be uneven, with many members engaging passively rather than contributing actively (Carpenter & Krutka, 2014; Lantz-Andersson et al., 2018).

The moderate to high factor loadings (0.412–0.780) suggest that these behaviors form a coherent construct, even though some items, such as mere membership, demonstrated higher uniqueness, reflecting variance unexplained by the factor. Future research may explore barriers and motivations influencing teachers’ active participation in professional online communities, including factors such as perceived usefulness, social presence and institutional encouragement (Lantz-Andersson et al., 2018; Trust & Horrocks, 2017).

5.2. Professional availability beyond working hours

The second factor, “Professional availability beyond working hours,” encompassed responding to calls or messages from colleagues, parents and principals during weekends, as well as communication with parents through messaging applications. Findings indicated that teachers frequently engage in professional communication outside formal working hours, with up to 95.4% responding to colleagues’ messages and 87.8% responding to principals during weekends. This pattern reflects broader evidence that digital technologies contribute to the intensification and extension of teachers’ work beyond traditional temporal boundaries. Research has shown that constant connectivity through digital communication platforms can blur distinctions between professional and private life, increasing perceived workload and reducing opportunities for psychological detachment from work (Kuusimäki et

al., 2019; Sokal et al., 2020). Studies on technostress in educational contexts further indicate that expectations of rapid responsiveness and continuous availability are associated with emotional exhaustion and diminished well-being among teachers (Jena, 2015). Taken together, these findings suggest that digitally mediated communication plays a significant role in reshaping professional norms around availability and contributes to the expansion of teachers' work into non-working time.

While such practices may enhance coordination and responsiveness, they may also contribute to role overload, work–family conflict and stress. Research on technostress and ICT-enabled work environments indicates that constant connectivity and expectations of rapid responsiveness are associated with increased strain, emotional exhaustion and work–family interference (Molino et al., 2020). In educational contexts specifically, digital school–home communication has been linked to reduced opportunities for psychological detachment from work and lower well-being when boundaries are unclear (Kuusimäki et al., 2019). The EFA loadings for this factor ranged from 0.443 to 0.663, with some items showing higher uniqueness, particularly for parent-related communication, which may reflect individual differences in boundary management practices and institutional communication norms. These findings underscore the importance of organizational policies and structured guidance in regulating expectations of availability. Evidence suggests that institutional support, clear communication norms and digital competence development can mitigate technostress and strengthen teachers' sense of autonomy and professional control (Molino et al., 2020; Sokal et al., 2020).

5.3. Communication with students

The third factor, “Communication with students,” included items assessing teachers' communication with students through messaging applications and their responsiveness to students' calls or messages during weekends. The results show that 39.7% of teachers reported communicating with students through closed Viber or WhatsApp groups, while 60.3% indicated that they do not use such communication channels with students. In addition, 56.5% of teachers reported responding to students' calls or messages during weekends, whereas 43.5% stated

that they do not respond during this time. These findings indicate that although direct communication with students via messaging applications is not universally practiced, a substantial proportion of teachers remain available to students outside regular working hours. This pattern suggests that digital communication increasingly extends teacher–student interaction beyond formal school time and reflects the growing integration of messaging technologies into everyday educational practice.

The factor loadings for this construct (0.525–0.797) and the internal consistency of the scale ($\alpha = 0.630$) suggest that these items form a meaningful dimension, although the moderate reliability indicates potential heterogeneity in how teachers perceive and manage digital work demands. An alpha in this range is considered acceptable for exploratory research and may reflect the multidimensional nature of teachers' experiences with digital communication (Tavakol & Dennick, 2011). Such variability is consistent with research demonstrating that the impact of digital communication on teachers' professional lives depends on contextual and individual factors, including workload structures, professional self-efficacy and personal boundary-management strategies (Skaalvik & Skaalvik, 2018).

Future research could therefore investigate potential moderating variables such as teaching experience, subject domain and school organizational climate, which may shape both the intensity of digital communication and its psychological consequences. For example, supportive school climates characterized by inclusive practices and high levels of collective efficacy have been linked to lower levels of job burnout and stress among teachers, in part through enhanced professional confidence and social resources (Y. Yang & Zhou, 2025). Incorporating these moderators into structural models could clarify whether digital work demands function primarily as stressors or, under supportive conditions, as resources that facilitate collaboration and professional engagement.

5.4. *Integration with previous literature*

The present findings align with the broader literature emphasizing the dual role of digital technology in teaching. On the one hand, digital platforms can facilitate collaboration, resource sharing and timely com-

munication, thereby supporting instructional improvement and professional learning. Research on teachers' participation in online professional communities indicates that digital environments may strengthen collegial exchange and access to pedagogical resources when embedded in meaningful professional networks (Trust, 2012; Carpenter & Krutka, 2015). Moreover, technology integration has been associated with expanded opportunities for professional development and innovative instructional practices, particularly when supported by coherent school strategies and teacher agency (Tondeur et al., 2017).

On the other hand, technology-mediated expectations for constant availability are increasingly linked to technostress, blurred work–life boundaries and heightened workload perceptions. Studies grounded in the job demands–resources framework show that intensified digital communication and connectivity can function as job demands that contribute to emotional exhaustion and work–family conflict (Skaalvik & Skaalvik, 2018; Molino et al., 2020). Research on technostress among educators demonstrates that constant connectivity, rapid communication cycles and platform multiplicity may undermine well-being when not accompanied by clear organizational norms and boundary management strategies (Joo et al., 2016).

The distinction between passive digital presence and active engagement observed in teachers' social media groups further suggests that technology alone does not ensure meaningful collaboration. Empirical studies of online professional learning networks indicate that while many teachers join digital communities, active knowledge sharing and dialogue are shaped by factors such as trust, perceived relevance, leadership support and community norms (Carpenter & Krutka, 2015; Trust, 2017). Thus, social and organizational conditions likely moderate whether digital tools function as resources that enhance professional capital or as demands that intensify stress.

Additionally, the study extends prior research by quantifying teachers' weekend availability and the perceived psychological consequences of digital connectivity. While existing papers frequently address technostress or ICT integration at a general level, the present findings differentiate specific communicative behaviors, namely interactions with parents, colleagues and students, thereby offering more fine-grained insight into how distinct communication channels contribute to

occupational strain. Research grounded in the technostress framework demonstrates that constant connectivity, expectations of rapid responsiveness and communication overload function as technology-related job demands associated with emotional exhaustion and reduced well-being (Tarafdar et al., 2007; Molino et al., 2020). In educational contexts specifically, intensified digital communication has been linked to increased workload perceptions and diminished psychological detachment from work, particularly when boundary-management norms are unclear (Skaalvik & Skaalvik, 2018; Joo et al., 2016).

By quantifying weekend responsiveness and distinguishing between different recipient groups, this study advances this literature by identifying concrete behavioral patterns through which digital availability translates into perceived stress. Such differentiation enables a more precise understanding of how various forms of communication may differentially operate as job demands within the job demands–resources framework, rather than treating digital connectivity as a uniform construct.

5.5. Summary of findings in relation to research questions

The findings of this study provide clear answers to the research questions. First, the exploratory factor analysis identified three underlying dimensions of digital communication practices (RQ1). Second, descriptive results demonstrated high levels of professional availability outside formal working hours (RQ2). Third, a substantial proportion of teachers reported that constant digital connectivity contributes to stress and blurred work–life boundaries (RQ3).

5.6. Practical implications

The findings suggest several practical implications for educational policy and school administration. First, schools should establish clear guidelines regarding digital communication expectations to prevent role overload and help teachers maintain boundaries between work and personal time, as excessive ICT demands have been consistently linked to technostress and work–life interference (Molino et al., 2020). Second, professional development initiatives should focus on building teachers' digital competence and promoting efficient, purposeful collaboration in

online professional communities, since supportive digital environments and adequate competencies can mitigate stress and enhance well-being (Fernández-Batanero et al., 2021; Skaalvik & Skaalvik, 2018). Third, interventions aimed at improving teacher well-being should explicitly address the psychological consequences of constant connectivity by incorporating stress-management strategies, time-management training and structured approaches to technology use that streamline rather than intensify work processes (H. Wang et al., 2015; Molino et al., 2020).

Moreover, understanding differences in communication practices across students, parents and colleagues can inform more tailored and sustainable approaches to digital engagement. Research indicates that the intensity and immediacy of ICT-based communication can increase perceived workload and stress, particularly when expectations for rapid responses blur professional boundaries (Molino et al., 2020; Skaalvik & Skaalvik, 2018). Encouraging the use of asynchronous communication channels, especially in interactions with parents and students, may help reduce pressure for immediate replies, support better time management and contribute to preserving teachers' work–life balance (Klapproth et al., 2020; Z. Wang et al., 2023).

5.7. Limitations and future research

Several limitations should be acknowledged. The cross-sectional design limits causal inference. While associations between digital practices and stress are evident, temporal dynamics cannot be established. Self-reported data may be subject to social desirability bias, particularly regarding responsiveness to students, parents and colleagues. The sample, though diverse, may not be fully representative of all educational contexts, limiting generalizability. Future research could employ longitudinal designs, objective measures of digital engagement (e.g., platform usage logs) and explore moderating factors such as personality traits, school culture and national policy contexts.

6. Conclusion

This study provides a comprehensive examination of teachers' digital communication practices, professional availability outside for-

mal working hours and the perceived impact of technology on work-life boundaries and occupational stress. Using descriptive statistics, frequency analyses and exploratory factor analysis, three primary dimensions of digital engagement were identified: (1) collaboration within teacher-focused social media groups, (2) professional availability beyond working hours and (3) communication with students. These findings highlight the complex role of digital technologies in contemporary educational contexts and underscore the need for nuanced understanding of their implications for teacher well-being and instructional practices.

The first dimension, teacher collaboration in social media groups, revealed that although a large majority of teachers maintain a presence in online professional communities, active participation in resource sharing, commenting and seeking advice is relatively limited. This suggests that while digital platforms facilitate access to knowledge and professional networks, they do not automatically translate into meaningful collaborative behaviors. Factors such as perceived usefulness, time constraints, digital literacy and institutional support moderate engagement levels. Encouraging active participation through structured professional development and incentives could enhance collaborative potential and contribute to teachers' professional growth.

The second dimension, professional availability beyond working hours, highlighted the prevalence of teachers responding to calls and messages from colleagues, parents and school principals during weekends and outside formal work hours. This pattern reflects a broader trend toward continuous connectivity in professional settings, which can enhance responsiveness and coordination but simultaneously contribute to role overload, work-life conflict and increased stress. Organizational policies clarifying expectations, promoting asynchronous communication and supporting boundary-setting can mitigate potential negative effects while maintaining professional collaboration.

The third dimension, communication with students, highlights the increasing role of direct digital interaction between teachers and students beyond formal classroom settings. A considerable proportion of teachers reported communicating with students through messaging applications and responding to their calls or messages during weekends. These findings indicate that student-teacher communication is no longer confined to school hours but increasingly extends into teachers' per-

sonal time. Such patterns reflect the growing integration of digital tools into everyday educational practice and the normalization of immediate accessibility. Establishing clear communication protocols, defining appropriate response times and promoting structured use of messaging platforms may support more sustainable and effective student–teacher interaction while maintaining professional boundaries.

An important contribution of this study lies in its connection to the concept of technostress in educational contexts. The findings suggest that teachers' digital communication practices, particularly those involving constant availability and responsiveness outside formal working hours, can be understood as specific manifestations of technostress. In line with existing theoretical frameworks, such as the job demands–resources model, continuous digital connectivity functions as a job demand that may contribute to emotional strain, blurred work–life boundaries and reduced opportunities for recovery.

By identifying distinct dimensions of digital communication behavior, this study provides a more nuanced understanding of how technostress emerges in everyday professional practices, rather than treating it as a general or abstract phenomenon. Specifically, professional availability beyond working hours and communication with students appear to represent key pathways through which digital technologies extend work demands into teachers' personal time.

These findings highlight the need to conceptualize technostress not only as an individual psychological response, but also as a structurally embedded feature of digitally mediated educational environments. Addressing technostress therefore requires not only individual coping strategies, but also institutional policies that regulate communication practices and support sustainable boundary management.

Collectively, the study demonstrates that digital technologies serve a dual role in teachers' professional lives: facilitating collaboration and access to resources while simultaneously creating demands that extend beyond conventional work boundaries. The findings have important theoretical implications, contributing to models of digital pedagogy, technostress and occupational well-being in educational contexts. They also carry practical relevance for school administrators, policymakers and teacher educators seeking to optimize the benefits of digital communication while minimizing its potential drawbacks.

In conclusion, the study highlights the need for balanced approaches to integrating digital communication into educational practice. While social media and messaging applications can enhance collaboration, professional availability and student support, they also pose challenges related to stress and blurred work-life boundaries. Schools and educational policymakers should develop clear guidelines, promote effective digital communication strategies and provide support mechanisms that foster active collaboration without overburdening teachers. By addressing these challenges, educational systems can leverage the benefits of digital technologies while safeguarding teachers' well-being, ultimately contributing to more sustainable, effective and supportive teaching environments.

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DIGITALNE KOMUNIKACIJSKE PRAKSE, PROFESIONALNA DOSTUPNOST I PERCIPIRAN TEHNOLOŠKI STRES KOD UČITELJA U OSNOVNIM ŠKOLAMA

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Ovo istraživanje istražuje strukturu i obilježja digitalnih komunikacijskih praksi učitelja te njihov percipirani utjecaj na profesionalni stres. Podaci su prikupljeni na uzorku od 131 učitelja osnovnih škola pomoću upitnika koji je obuhvaćao online profesionalnu komunikaciju s kolegama, roditeljima i učenicima, dostupnost izvan radnog vremena te percepcije stalne povezanosti. Deskriptivna statistika pokazala je raširenu uporabu društvenih mreža i aplikacija za razmjenu poruka u profesionalne svrhe, pri čemu je velik udio učitelja izvijestio o dostupnosti kolegama, ravnatelju, roditeljima i učenicima tijekom vikenda. Većina ispitanika smatra da digitalne tehnologije zamagljuju granice radnog vremena i pridonose povećanom profesionalnom stresu. Rezultati ukazuju na složenost digitalnih komunikacijskih praksi učitelja te upućuju na potrebu za jasnijim profesionalnim smjernicama i institucionalnom podrškom usmjerenom na zaštitu granica između poslovnog i privatnog života u digitalno posredovanim obrazovnim okruženjima.

Ključne riječi: digitalna komunikacija; profesionalne prakse učitelja; granice između poslovnog i privatnog života; profesionalni stres; stalna povezanost; tehnološki stres (technostres)