



Digital divergence: How online media and techno-stress shape communication competencies across higher education roles

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Abstract

This study aimed to explore the utilization of online media and its impact on techno-stress and communication competence among higher education personnel, including students, faculties, institutional administrators and staff. Drawing from a sample of 2,500 respondents across Thailand, our findings revealed a significant reliance on platforms like Facebook, Line, and Zoom for academic tasks. The study identified a moderate level of techno-stress, with techno-insecurity and techno-uncertainty being the most pronounced stressors. Despite these challenges, higher education personnel reported high communication competence, particularly in content and knowledge creation and collaboration aspects. Notably, the impact of techno-stress varied among groups, with students and institutional administrator showing increased communication competence by 1.8 percent and 10.2 percent respectively, while instructor and staff groups indicated prediction percentages of 1.3 percent and 6.9 percent. The data also reveal that the relationship between the independent variables and the dependent variable is predominantly positive if present. Online media usage positively impacts communication competence across all these groups. In contrast, techno-stress positively influences the communication competence of students and institutional administrator only. The structural model confirmed that online media usage and techno-stress collectively accounted for 2.7 percent of the variance in communication competence. This influence, though modest, underscores the intricate interplay between technology and communication skills in academia and suggests the need for targeted interventions and support mechanisms for different groups within the higher education sector.

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Introduction

The outbreak of Covid-19, declared a global health emergency in early 2020 (World Health Organization, 2020), caused a significant disruption to education worldwide. In Thailand, the pandemic necessitated the closure of educational institutions under the Infectious Disease Act of 2015, prompting a rapid transition to online learning (Faculty of Medicine Ramathibodi Hospital, 2020; Hill, 2020). Online learning, characterized by computer-mediated communication and multimedia content delivery (Sikhman, 2011; as cited in Banlue, 2017; Siriwon, 2005, as cited in Yeesai, 2013), offers flexibility but also introduced challenges, particularly in adapting to unfamiliar technologies.

The abrupt shift in technological environment increased stress for both students and instructors as well as academic staff. Li and Wang (2020) have characterized this “techno-stress” into four types: Techno-Overload, Techno-Complexity, Techno-Insecurity, and Techno-Uncertainty. Studies have shown that the pandemic heightened anxiety, depression, and workload pressures among students and instructors (Moawad, 2020). Yang et al. (2021) observed that online learning not only increased students’ workloads but also intensified feelings of isolation. Similarly, Fawaz and Samaha (2020) reported higher rates of anxiety and depression, especially among first-year students, while Fruehwirth et al. (2021) highlighted the psychological toll of remote learning and social isolation. Therefore, examination of such phenomenon in Thailand would shed light on the issue and yield alternatives to tackle the future higher education management.

Despite extensive research on the stressors associated with online learning, there remains a significant gap in understanding how these stressors collectively referred to as techno-stress impact on communication competencies across different roles in higher education. While studies have examined the challenges posed by techno-stress on teaching and learning outcomes, little focus has been put on how these challenges influence the ability of students, faculty members, administrators and staff to communicate efficiently in an academic setting. Communication competence is crucial in this context, as it underpins collaboration, content creation, and problem-solving, which are key factors for academic and professional success.

This study aims to address these gaps by exploring the interplay between online media usage, techno-stress, and communication competence among higher education

personnel in Thailand. By examining the experiences of students, instructors, institutional administrators, and academic staff across six regions and 24 provinces, this research seeks to provide insights into how online media and technology-driven stress influence communication competence. The findings will edify strategies for enhancing digital adaptation and resilience within the higher educational sector, ensuring preparedness for the “New Normal” of education in a post-pandemic era.

Literature Review

Trends in Online Media Usage and Learning

Online media, described by Wongsathitsathien (2006, as cited in Pansung, 2016) as “New Media,” bridges interpersonal and mass communication through real-time interaction and user participation. In the context of higher education, online media tools have become indispensable for academic tasks, with platforms categorized into three main types: Social Media, Chat Applications, and Online Meeting Platforms. This classification reflects their integration into teaching, learning, and communication activities within academic environments.

Studies consistently highlight the extensive engagement of students with online social networks, especially during the evening. For instance, Facebook remains the most popular platform for both entertainment and academic activities (Thongmeekhaun et al., 2020). Students reportedly spend an average of 4–5 hours daily on social media, often during peak hours from 8 PM to midnight (Eiamrit, 2016). These behaviors emphasize the dual role of these platforms in supporting both leisure and educational pursuits, with students frequently using them to retrieve information, contact instructors, and watch educational videos (Phookwantong et al., 2020). This aligns with findings from Sarawanawong et al. (2017), which observed widespread digital media use among university students, peaking from evening to early morning, with Line, YouTube, and Facebook being the platforms of choice.

Instructors and students also rely on online meeting platforms such as Zoom, which has demonstrated advantages over alternatives like Skype in facilitating interactive learning. For example, Dharma et al. (2017) found that using Zoom for teaching basic Japanese grammar significantly improved learning outcomes among Indonesian students aged 20–30. Similarly, Yamsri (2019) showed that Zoom enhanced students’ knowledge and skills in pregnancy care training compared

to traditional methods. Supporting these findings, Chooa et al. (2018) reported high student satisfaction with Zoom's features, which effectively replicate a traditional classroom environment, highlighting its potential for improving communication and collaboration in higher education.

Exploring Techno-Stress in the Modern Era

Types and Emotional Impacts of Techno-Stress

Christian et al. (2020) categorized the techno-stress into four distinct types:

1. **Techno-Overload:** Stress from heightened expectations due to technology's convenience, leading to potential burnout and both physical and mental exhaustion.

2. **Techno-Complexity:** Stress arises from the intricacies associated with mastering new technology. The abrupt shift to online teaching methods, distinct from traditional face-to-face interactions, can induce feelings of anxiety and reduce long-term efficiency.

3. **Techno-Insecurity:** Rooted in doubts about technology's reliability, this stress manifests as concerns about unstable internet connections during pivotal online sessions or fears of technology superseding human roles in education.

4. **Techno-Uncertainty:** Stress induced by the relentless evolution of technology. With frequent software updates and changing platforms.

The emotional toll of these stressors is significant. Studies by Alibak et al. (2019), Fawaz and Samaha (2020), and Yang et al. (2021) highlight how techno-stress contributes to anxiety, stress, and depression, adversely affecting academic performance and overall well-being.

Christian et al. (2020) found that in Jakarta, techno-complexity and techno-insecurity were significant stressors for instructors, reducing teaching performance, while techno-overload sometimes led to positive productivity outcomes. Li and Wang (2020) observed similar patterns in China. In Lebanon, Fawaz and Samaha (2020) reported increased stress and dissatisfaction among students using platforms like Zoom. Fruehwirth et al. (2021) and Moawad (2020) noted that the sudden transition to online learning heightened anxiety and depression, especially among first-year students. In other contexts, Upadhyaya and Acharya (2021) in India identified that techno-overload and techno-uncertainty negatively impacted academic productivity. Oladosu et al. (2020) observed that technology use for academic purposes increased stress among students, further

exacerbated by environmental factors like noise and heat during online learning sessions.

Impacts of Techno-Stress in Academic Settings

The sudden shift to online learning during the COVID-19 pandemic amplified challenges associated with digital adaptation. Techno-stress, a phenomenon characterized by feelings of overload, complexity, insecurity, and uncertainty due to technology use—has been extensively documented in educational contexts. Li and Wang (2020) identified these categories of techno-stress, which affect both students and instructors, often leading to reduced engagement and increased anxiety. Christian et al. (2020) noted that the rapid transition to online platforms created significant stress for instructors, negatively impacting teaching effectiveness.

Students also faced heightened psychological challenges during this period. Yang et al. (2021) observed that the increased workload and isolation associated with online learning contributed to higher stress levels. Similarly, Fawaz and Samaha (2020) reported elevated rates of anxiety and depression among students, particularly first-year learners, while Fruehwirth et al. (2021) highlighted the long-term psychological toll of remote learning and social isolation.

While much research addresses the general impact of techno-stress across industries, its unique implications for higher education remain underexplored. For example, Mingprasert and Sheng (2014) observed that the abrupt transition to online learning during the pandemic exacerbated stress due to unfamiliar platforms and inadequate digital skills. Although these findings emphasize the challenges of techno-stress, its specific influence on critical competencies such as communication remains underexamined. Understanding how techno-stress affects communication competence is crucial for addressing gaps in academic performance and collaboration.

Roles of Higher Education Personnel

Higher education personnel refer to individuals with varying statuses and roles within higher education institutions. This includes institutional administrators, teaching instructors, staff/officers, and learners, namely, students. Administrators oversee institutional management and ensure the quality of both the curriculum and the institution. Staff or officers handle the operational aspects of educational management and teaching. Instructors, focus on imparting knowledge and

facilitating effective communication to ensure productive learning. Their goal is to produce quality graduates who can contribute positively to society. Therefore, educational personnel have responsibilities spanning administrative tasks, teaching, and documentation. The rapid shift to online education during the COVID-19 pandemic highlighted the multifaceted challenges posed by techno-stress. Recognizing and addressing these stressors is crucial for improving the online learning experience for higher education personnel. By understanding the specific impacts of techno-stress on instructors and students, institutions can develop targeted strategies to enhance digital adaptation and foster academic success.

Understanding Competence in the Digital Age

In an era increasingly dominated by digital technology, understanding the interplay between online media usage, techno-stress, and competence becomes paramount, especially given the challenges posed in our tech-driven educational and professional environments. Truangthonglang et al. (2020) define competence as the ability to apply knowledge, skills, and attributes to meet task standards. Echoing David McClelland's insights, competence is seen as an innate quality that spurs individuals to meet or even surpass performance benchmarks. This intrinsic behavior, as highlighted by Chorkaew (2018), further emphasizes that competence fuels efficient task execution, consisting of Skills, Knowledge, and Attributes such as Self-Concept, Traits, and Motive/Attitude. In the context of their research, communication competence is segmented into six distinct dimensions: (1) Work Performance, (2) Problem Solving, (3) Communication, (4) Information Management, (5) Collaboration, and (6) Content and Knowledge Creation.

Research Questions

This study aims to delve into these aspects, leading to the following research questions:

How do higher education personnel utilize online media in their academic tasks?

What is the nature of techno-stress experienced by higher education personnel in their academic roles?

What is the nature of communication competence within the higher education sector?

How do online media usage and techno-stress act as predictors for the communication competence of higher education personnel in their academic tasks? The hypotheses are as follows:

Hypothesis 1: The use of online media in higher education has an influence on the communication competence of the personnel.

Hypothesis 2: Techno-Stress in higher education has an influence on the communication competence of the personnel.

Methodology

Research Population and Sampling Methods

The research employed the Yamane (1967) formula, as cited by Taveerat (1988), to calculate a sample size of 2,500, ensuring statistical adequacy for a population exceeding 100,000. The sample was distributed across six geographical regions of Thailand, encompassing urban and rural settings to reflect diverse experiences with online media usage and techno-stress. Institutions were randomly selected to include both public and private universities, ensuring representation across key higher education roles: students, faculty members, administrators, and staff.

The study spanned 24 provinces across six regions. Bangkok and its surrounding areas contributed 300 respondents from 10 randomly selected institutions, evenly split between public and private universities. The remaining 2,200 respondents were drawn from 23 provinces, with each institution contributing 20 participants. For provinces with fewer than 10 institutions, nearby provinces were included to meet quotas, ensuring balanced representation by institutional affiliation, size, and location. The regions and selected provinces were as follows: Central (Bangkok, Phitsanulok, Nakhon Sawan); Eastern (Chonburi, Chachoengsao, Chanthaburi, Rayong, Sa Kaeo); Northern (Chiang Mai, Chiang Rai, Lampang); Northeastern (Ubon Ratchathani, Sisaket, Khon Kaen, Nakhon Ratchasima); Western (Kanchanaburi, Tak, Prachuap Khiri Khan, Ratchaburi, Phetchaburi); and Southern (Songkhla, Yala, Nakhon Si Thammarat, Surat Thani).

The final dataset consisted of 15 percent institutional administrators (375), 20 percent teaching instructors (500), 15 percent staff/personnel (375), and 50 percent students (1,250), ensuring comprehensive representation for analysis. The proportions of the final dataset were strategically chosen to reflect the composition of the higher education ecosystem. Students accounted for the largest group (50%) due to their critical role as primary users of online media and key stakeholders in higher education outcomes. Teaching instructors (20%) were included

to capture the perspectives of educators who directly interact with students and online platforms. Institutional administrators (15%) and staff/personnel (15%) were equally represented to ensure insights from leadership and operational roles, which significantly influence institutional policies and infrastructure. This balanced distribution allowed for a nuanced understanding of the interplay between online media usage, techno-stress, and communication competence across all roles within higher education.

Inclusion Criteria

Participants were required to meet the following inclusion criteria: (1) aged between 17 and 61; (2) affiliated with higher education institutions in roles such as administrators, instructors, staff, or students; and (3) using online social media for academic or work purposes at least three times a week. These criteria ensured a relevant and diverse sample for analyzing the effects of online media usage and techno-stress on communication competence.

Design and Structure of the Questionnaire

A structured questionnaire was the primary tool for quantitative data collection, focusing on four key variables: demographic characteristics, online media usage, techno-stress, and communication competence. These variables were measured using Nominal, Interval, and Ratio Scales. A pre-test was given with 30 educational personnel from higher education institutions to ensure clarity and consistency in the questions. The reliability was then verified by calculating the Cronbach's Alpha Coefficient, ensuring internal consistency across all questionnaire items. The reliability scores for each construct exceeded the acceptable threshold of 0.7, demonstrating the consistency and stability of the measurement instrument. Validity was verified through a two-step process. Content validity was established via expert review, where a panel of specialists evaluated the questionnaire for clarity, relevance, and alignment with the research objectives. Construct validity was tested using exploratory factor analysis (EFA) to confirm that the items effectively measured the theoretical constructs of online media usage, techno-stress, and communication competence. These measures ensured both the reliability and validity of the study's data collection tool.

Following the sampling process, data collection was conducted using a structured questionnaire designed to capture diverse perspectives from institutional

administrators, instructors, staff, and students. The questionnaire was divided into five sections, totaling 57 questions:

Screening Questions (3 items): This section covered educational personnel in the institution, experience using online media for work and study, and willingness to participate.

General Information (8 items): Collected data on demographics as gender, age, education level, current position in the higher education institution, average income, affiliated faculty/course, affiliated higher education institution, and the region of the affiliated institution.

Online Media Usage (15 items): This section explored the regular online social media platforms used, communication applications, online meeting rooms frequented, total online media usage duration in a day, time slots for online media usage, devices used to access online media, and the use of online media to meet work requirements in higher education.

Techno-Stress (20 items): Questions here gauged stress levels related to techno-overload, techno-complexity, techno-uncertainty, and techno-insecurity.

Communication Competence (12 items): Evaluated skill in work/learning, problem-solving, communication, information management, collaboration, and content and creation.

Data Analysis

The researcher used SPSS (Statistical Package for Social Science) to analyze the questionnaire data. Descriptive statistics, including percentages, mean, and standard deviation, were employed to describe the demographic characteristics of the sample group. For hypothesis testing, inferential statistics like regression analysis and the Structural Equation Model (SEM) were utilized. The SEM's accuracy was validated using Confirmatory Factor Analysis, ensuring the model's fit to the observed data. These methods helped clarify relationships between variables and address the research objectives. For interpretative purposes, the Likert scores for techno-stress and communication competence—reflected in sub-item opinion agreements—are categorized as follows: Very High (5.00–4.21), High (4.20–3.41), Moderate (3.40–2.61), Low (2.60–1.81), and Very Low (1.80–1.00). These categories provide a clear and structured way to assess participants' responses and analyze the data in a meaningful and consistent manner.

The interpretation of these scores was guided by established methodologies and benchmarks. The ranges were derived using the principles outlined by Bluman (2014), which emphasize the use of grouped frequency distributions to determine data widths. The adoption of a 5-point Likert scale aligns with prior research, including studies by Christian et al. (2020), Gopal et al. (2021), and Yang et al. (2021). These studies utilized 5-point scales to measure variables such as techno-stress, anxiety, depression, workload impacts, and student satisfaction, affirming its effectiveness in assessing perceptions and attitudes within educational and behavioral research contexts.

Results

Demographic Characteristics of the Sample Group

The majority of participants were female (56.28%, 1,407 individuals), with the largest age group being 17–21 years (35.6%, 890 individuals). Most held an undergraduate degree or equivalent (62.72%, 1,568 individuals). The sample comprised 50 percent students (1,250), 17.88 percent instructors (447), 14.36 percent institutional administrators (359), and 17.76 percent staff/officers (444). The average income was 22,177.27 Baht/month. Regarding academic affiliation, 51.56 percent (1,289) were from Science and Technology, and 48.44 percent (1,211) were from Social Sciences and Humanities. Participants were mostly from government institutions (57.92%, 1,448), with the remainder from private institutions (42.08%, 1,052). Bangkok and its vicinity had the highest representation at 12 percent (300 individuals).

Obj 1: How do higher education personnel utilize online media in their academic tasks?

Social Media Usage: Facebook was the most used platform (60.32%, 1,508 individuals), with an average usage of 5.94 hours/day, primarily via smartphones (76.8%). Most users (62.56%, 1,564) accessed it for academic tasks.

Communication Applications: Line was the leading app (62.84%, 1,571), averaging 5.54 hours/day, mainly via smartphones (75.04%). Academic tasks accounted for 60.12 percent (1,503) of its usage.

Online Meeting Platforms: Zoom was the most used platform (56.44%, 1,411), with an average usage of 3.80 hours/day. Most activity occurred between 08:01-16:00 (80.52%, 2,013), accessed primarily via computers

(48.32%), and used for academic tasks by 67.48 percent (1,687).

Obj 2: What is the nature of techno-stress experienced by higher education personnel in their academic roles?

Overall Techno-Stress: The sample reported a moderate level of techno-stress, with an average score of 3.48. “Techno-insecurity” ranked highest with a “high” stress score of 3.82, followed by “techno-overload” (3.52), “techno-complexity” (3.32), and “techno-uncertainty” (3.32), all indicating moderate stress levels.

Key Stressors: “Techno-insecurity” emerged as the most significant source of stress, with top-rated concerns including compatibility of devices (3.88), evolving technology (3.86), frequent platform changes (3.84), and constant technological advancement (3.82). “Techno-uncertainty” also contributed significantly, with many personnel feeling pressured to continually improve their online teaching skills (3.86). These findings highlight how rapid technological changes and frequent updates to online platforms create insecurity and overwhelm staff.

Obj 3: What is the nature of communication competence within the higher education sector?

Overall Competence: The sampled cohort demonstrated a “high” level of communication competence, with an average score of 4.08. The highest competence was in “content and knowledge creation” (4.20), followed by “collaboration” (4.12), and “work/learning,” “information management,” and “problem-solving” (each 4.05). “Communication” scored 4.02, reflecting consistently high competence across categories.

Key Competencies: Top-rated competencies included eagerness to learn about online media (4.28) and creative content production (4.11) within “content and knowledge creation.” In “collaboration,” familiarity with online communication tools (4.12) and fostering collaboration (4.11) were highlighted. For “problem-solving,” effectively addressing work-related issues using online media scored 4.09. These findings suggest personnel possess a well-rounded digital skill set, excelling in content creation, collaboration, and problem-solving, with a strong drive to further enhance their digital proficiency.

Obj 4: How do online media usage and techno-stress act as predictors for the communication competence of higher education personnel in their academic tasks?

To address this objective, a structural equation model (SEM) analysis was conducted to evaluate the influence of these variables, with the results presented in [Table 1](#).

Table 1 Influence of online media usage and techno-stress on communication competence

Communication competence	
Online media usage	0.112*
Techno-Stress	0.091*
R^2	.027

Note: $\chi^2 = 0.00$, $df = 0$, p - value = 1.00, CFI = 1.00, GFI = 0.933, AGFI = 0.865, RMSEA = .185 * $p < .05$

The structural equation model (SEM) analysis provides a detailed evaluation of the model's alignment with the observed data. The Chi-Square (χ^2) value of 0.00, with a p -value of 1.00, indicates no significant discrepancy between the observed and expected covariance matrices, reflecting an excellent fit. The Comparative Fit Index (CFI) value of 1.00 further underscores the model's robustness, as values close to 1 signify an optimal fit.

The Goodness of Fit Index (GFI) and Adjusted Goodness of Fit Index (AGFI) values of 0.933 and 0.865, respectively, confirm the model's strong and adjusted fit, providing additional support for its adequacy. However, the Root Mean Square Error of Approximation (RMSEA) value of 0.185 exceeds the conventional threshold for a good fit (typically ≤ 0.08). While this indicates some limitations in the model's approximation, the strength of the other indices supports its overall credibility.

These findings collectively suggest that the proposed SEM is a reliable representation of the observed data, despite the elevated RMSEA value. The results highlight the need for cautious interpretation and consideration of potential refinements to address the model's limitations. The following Figure 1 illustrates the derived model and its empirical underpinnings.

Online media usage and techno-stress collectively account for 2.7 percent of the variance in communication competence, reflecting their nuanced contributions to this multi-dimensional construct. While the variance may

seem small, it is significant in behavioral research, where outcomes are influenced by numerous factors. Online media usage serves as a critical enabler of communication competence, highlighting the potential for targeted interventions such as digital literacy programs to improve academic performance and collaboration. Conversely, techno-stress demonstrates a complex relationship with communication competence, where the pressure to adapt to evolving technologies can motivate higher education personnel to enhance their communication skills. Addressing techno-stress through initiatives like stress management workshops or technological support systems could further strengthen this relationship.

This low variance underscores the need to consider additional factors, such as institutional policies, access to technology, and individual adaptability, which likely play a role in shaping communication competence. These findings emphasize the importance of future research to explore broader predictors and refine the understanding of how technology-related factors influence communication skills in academic environments. By delving deeper into these dynamics, higher education institutions can develop tailored strategies to support their personnel in navigating the challenges and opportunities of a technology-driven landscape.

To ensure the transparency, statistical methods were explicitly linked to the hypotheses. Hypotheses related to relationships between variables were tested using Structural Equation Modeling (SEM), which examined direct and indirect effects while evaluating model fit through indices such as CFI, GFI, and RMSEA. Hypotheses focusing on predictive relationships and subgroup comparisons employed multiple regression analysis to identify significant predictors and assess their strength.

- Hypothesis 1: The utilization of online media significantly impacts the communication competence of academic personnel, with a positive association quantified by a coefficient of 0.112, statistically significant at the

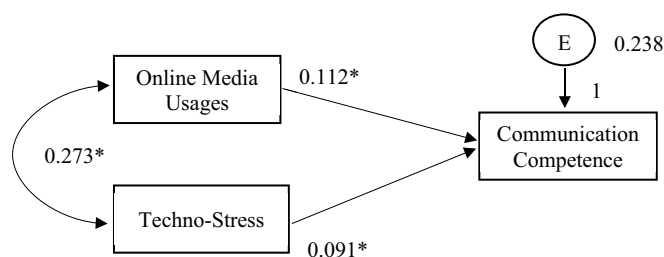
**Figure 1** Influence of online media usage and techno-stress on communication competence: a structural model representation

Table 2 Technology-related factors and the communication skills of higher education officers

	Communication Competence			
	Students	Instructor	Institutional administrator	Staff
Online media usage	.069*	.112*	.236*	.246*
Techno-stress	.094*	.010	.157*	.045
R2	.018	.013	.102	.069

Note: $\chi^2 = 0.00$, $df = 0$, p - value = 1.00, CFI = 1.00, GFI = 0.917, AGFI = 0.834, RMSEA = .103 * $p < .05$

0.05 level.

• Hypothesis 2: The experience of techno-stress influences the communication competence of higher education personnel, with a positive correlation reflected in a coefficient of 0.091, also significant at the 0.05 level. These findings highlight the nuanced interplay between technology-related factors and communication skills. Further subgroup analyses, using chi-square tests, revealed differences in influence values across roles, providing deeper insights into how online media usage and techno-stress differentially affect academic personnel in various capacities. The results of these subgroup analyses are presented in Table 2.

The structural equation model presented a chi-square value of 0.00, with $df = 0$ and a p-value of 1.00, suggesting a good fit with the empirical data. The causal variables, specifically the use of online media and techno-stress, were found to predict communication competence in varying degrees across different groups: 1.8 percent for students, 1.3 percent for instructor, 10.2 percent for institutional administrator, and 6.9 percent for staff/personnel.

The data table reveals that online media usage positively impacts communication competence across all these groups. In contrast, techno-stress doesn't seem to affect the instructor/teacher and staff/personnel groups. However, it positively influences the communication competence of students and institutional administrators. This indicates that the structural equation model's applicability differs among the groups. Overall, the relationship between the independent variable and the dependent variable is predominantly positive if present.

Discussion

The Prevalence of Online Media and Techno-Stress

Online media and communication applications usage among higher education personnel

The study reveals significant engagement with online platforms like Facebook, Line, and Zoom,

initially designed for social interactions, that have found a corresponding space within academic settings. An illustrative 60 percent of our study participants have repurposed Facebook and Line for academic activities, signifying a transformative shift in pedagogical modalities.

It is important to highlight the distinct engagement patterns observed. Whereas platforms such as Facebook register peak activity during evening hours, Zoom is primarily used during standard working hours (08:01–16:00). This not only accentuates Zoom's indispensable position in real-time academic dialogue but also correlates with Wongsathitsathien's (2006, as cited in Pansung, 2016) findings on the importance of timely interaction in Thai online media. Zoom's superiority in educational contexts is further supported by Dharma et al. (2017), where it outperforms Skype.

Moreover, the sustained and extensive involvement on these platforms signifies their pivotal role in contemporary academic practice. This observation finds resonance in studies by Eiamrit (2016) and Phookwantong et al. (2020), which spotlight students allocating an average of 4–5 hours daily to these platforms.

In summation, the study conclusively underscores the cardinal role of these platforms in synchronous academic communications within the sphere of online media.

Techno-stress and communication competence in the realm of higher education

While online media has transformed academic processes, it has also introduced the challenge of techno-stress. The data point to a significant level of stress experienced by the higher education personnel, with "techno-insecurity" emerging as the most potent source. This type of stress, driven by the continuous evolution of online learning platforms, often leaves educators in a state of perpetual adaptation. The rapidity of changes in these tools can foster feelings of being overwhelmed, thereby heightening stress. Additionally, "techno-uncertainty" emerges as another key stressor, emphasizing the need for educators to continuously update their skills to keep pace with advancing technology, contributing to ongoing

stress.

Christian et al. (2020) resonates with our findings on techno-stress, highlighting the complexities and insecurities faced by educators when thrust into the online teaching milieu. Particularly, their insights on techno-complexity and techno-insecurity corroborate our data points on the continual pressure educators face to stay updated. The emotional burden, as expounded upon by Alibak et al. (2019) and Yang et al. (2021), reiterates the profound repercussions techno-stress has on mental well-being, echoing the sentiments revealed in our study.

Contrastingly, when examining communication competence, a brighter picture emerges. Educators are not merely passive receivers but are proactive contributors in online domains. Their impressive scores in “content and knowledge creation” signal an active engagement with digital tools for knowledge dissemination; “collaboration” metrics further affirm that educators proficiently harness online platforms for collaborative endeavors in both team projects and teaching. Lastly, the high competence in “problem-solving” via online media indicates a pedagogical shift, wherein digital platforms are not just repositories of information but tools to address academic challenges innovatively.

Structural Equation Model on Communication Competence in Higher Education

The results of our study affirm the hypothesis, indicating that online media use and techno-stress predict communication competence in higher education tasks, accounting for 2.7 percent of the variance. While online media enhances communication competence, techno-stress, intriguingly, also has a positive impact on communication competence within this context.

The structural equation model’s findings provide further granularity. The model’s good fit with the empirical data, as evidenced by a chi-square value of 0.00 and a p-value of 1.00, underscores its reliability. The causal variables’ ability to predict communication competence varied across groups, with students at 1.8 percent, instructor at 1.3 percent, institutional administrator at 10.2 percent, and staff/personnel at 6.9 percent. This variation suggests that different sectors within the higher education community might experience the impacts of online media and techno-stress differently. Notably, while online media consistently enhanced communication competence across all groups, techno-stress’s influence was more selective, positively impacting students and institutional administrator but not instructor or staff. This nuanced understanding challenges a one-size-fits-all

approach and calls for tailored strategies to harness the benefits of online media and address the challenges of techno-stress in higher education.

The results of our study, which highlight the differential impacts of online media usage and techno-stress on communication competence across various groups within higher education, resonate with broader academic discourses. The affirmation of online media as a positive influencer of communication skills aligns with the findings of Greenhow et al. (2009). They observed that students using social media platforms for educational purposes often exhibited improved communication and collaboration skills. This suggests that the integration of online platforms into educational settings can foster a more collaborative and communicative environment.

However, the nuanced impact of techno-stress, while it enhances communication competence for students and administrators, it does not do the same for instructors and staff. This aligns with Tarafdar et al. (2015), who proposed that techno-stress might lead to adaptive behaviors, leading to improved communication competence through collaboration and problem-solving. Conversely, Ragu-Nathan et al. (2008) emphasized the negative ramifications of techno-stress, such as decreased productivity and job satisfaction. Their findings hint at the possibility that such stress could affect communication, especially for specific groups.

In light of these references, our study underscores the importance of a nuanced understanding of the interplay between technology-related factors and communication competence. It suggests that while there are overarching trends, individual experiences and impacts can vary significantly based on one’s role within the higher education ecosystem. This calls for more tailored interventions and strategies to maximize the benefits of online media and mitigate the challenges posed by techno-stress.

Roles and Competence in Higher Education

The digital transformation of higher education has brought both opportunities and challenges to the forefront. The integration of online media into the academic sector, as our study suggests, has had a profound impact on communication competence across different groups within higher education. The high communication competence observed among the sample group is indicative of the adaptability and resilience of higher education personnel in navigating the digital landscape.

Our study reveals that while online media has

bolstered communication skills across all groups, the impact of techno-stress varies. Specifically, students and institutional administrators have shown increased communication competence by 1.8 percent and 10.2 percent respectively, potentially leveraging technological challenges as learning opportunities. In contrast, the instructor, and staff groups, with prediction percentages of 1.3 percent and 6.9 percent, seem less influenced by these stressors, possibly due to their established routines in the academic environment.

Truangthonglang et al. (2020) emphasized that competence transcends mere skill acquisition; it is about application in diverse contexts. The varied percentages across groups in our study echo this sentiment, suggesting that while skills might be uniformly acquired, their application is influenced by the unique challenges and responsibilities each group faces. As the digital landscape continues to evolve, understanding these nuanced differences is crucial for tailoring strategies that cater to the specific needs of each group within the higher education sector.

Conclusion and Recommendation

Implications for future research

Future research directions

Future studies should comprehensively explore how communication competence varies across students, instructors, administrators, and staff in higher education, with an emphasis on role-specific challenges and opportunities. Investigating predictors such as institutional communication practices, technological demands, and digital collaboration capabilities can provide targeted strategies to enhance communication skills. Research should also address the dual impact of techno-stress, examining how it can hinder performance or act as a catalyst for skill development. Interventions like stress management programs, institutional support systems, and technology training should be assessed for their effectiveness in mitigating negative effects while fostering collaboration and problem-solving skills. Additionally, studies should identify which online media platforms most effectively enhance communication competence and address disparities in digital literacy and access to technology. Longitudinal and cross-cultural research would provide valuable insights into how prolonged media use and cultural contexts influence communication skills, offering actionable recommendations for supporting diverse academic roles

in technology-driven environments.

Methodological suggestions

Future research should adopt mixed methods, expand sample diversity, and use advanced statistical techniques like multi-group SEM to uncover subgroup differences. Investigating technologies such as AI tools and immersive platforms could provide actionable insights to enhance communication competence effectively in higher education settings.

Implications of future strategy

Recognizing and addressing techno-stress is essential for enhancing the online learning experience. Institutions should provide targeted training, support, and adaptation strategies to help all stakeholders navigate the digital age effectively.

1. Professional Development: The varying impact of techno-stress on different groups suggests a need for targeted professional development. Instructor and staff, who seem less influenced by techno-stress, might benefit from training that focuses on leveraging digital tools for enhanced communication and productivity.

2. Prioritizing Counseling and Support Services: Given the reported stress levels, counseling services tailored to address the specific challenges faced by higher education personnel become pivotal, echoing the sentiments of several studies on the emotional implications of techno-stress. Though, the positive impact of techno-stress on students' communication competence suggests that some level of challenge can be beneficial, institutions should also offer robust support services to help students manage stress effectively, ensuring it doesn't tip over into burnout.

3. Instituting Feedback Mechanisms: To tailor online offerings effectively, institutions should establish feedback mechanisms, allowing them to address the diverse range of experiences with online platforms reported in our findings.

4. Administrative Strategy: The high impact of techno-stress on institutional administrator (10.2%) suggests that this group might be the most adaptable but also the most susceptible to the negative impacts of stress. Strategies to manage this stress at the organizational level could include regular digital detox sessions or stress management workshops.

5. Building a Collaborative Community: To counteract the decline in knowledge sharing due to fears of underperformance, institutions should foster a supportive community, possibly by creating online forums or groups for instructors to share experiences.

Conflict of Interest

The author declares that there is no conflict of interest.

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