

# The impact of technostress and role overload on innovative work behavior among higher vocational teachers: The mediating role of emotional exhaustion and intrinsic motivation

Zhidi Zhang, Lina Li\* and Jirawan Deeprasert

Rattanakosin International College of Creative Entrepreneurship, Rajamangala University of Technology Rattanakosin, Salaya, Nakhon Pathom, 73170, Thailand.

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## ABSTRACT

Considering the fast development of digital technologies and the changing requirements of the labor market, innovative work behavior (IWB) among higher vocational college teachers is crucial for the sustainability and adaptability of vocational education. This study draws from the Job Demands–Resources (JD–R) model and Conservation of Resources (COR) theory to explore how job demands shape innovative work behaviors among teachers in China’s higher vocational colleges. Using a convenience sampling approach, data were collected from 581 full-time teachers through an online survey distributed via Wenjuanxing. Structural equation modeling with bootstrapping was applied to investigate both direct and indirect effects. The results indicated that technostress and role overload operate primarily as hindrance stressors, exerting direct negative effects on innovative work behavior while also indirectly inhibiting IWB by increasing emotional exhaustion and reducing intrinsic motivation. Theoretically, this study contributes to the literature of JD–R and COR frameworks by clarifying the resource-depletion and motivational-loss mechanisms through which digitally driven and role-related job demands constrain teachers’ innovation. Practically, the findings suggest that alleviating excessive technological pressures and role demands is essential for reducing emotional exhaustion, enhancing intrinsic motivation, and ultimately fostering innovative work behavior among higher vocational college teachers.

**Keywords:** Emotional exhaustion, higher vocational teachers, innovative work behavior, intrinsic motivation, role overload, technostress.

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\*Corresponding author. E-mail: li.lina@rmutr.ac.th.

## INTRODUCTION

Globally, the rapid pace of the industrial revolution and technological transformation is reshaping the labor market, leading to increasingly complex and advanced skill demands (World Economic Forum, 2025). The widespread application of emerging technologies like Artificial Intelligence (AI), Big Data, Augmented Reality (AR), and Virtual Reality (VR)—is fundamentally transforming traditional work patterns, rendering traditional vocational skills insufficient for the future workforce (Hossain, 2023; Thangavel et al., 2025). In this evolving landscape, higher

vocational education serves as a vital bridge between education and employment, necessitating proactive innovation to ensure students acquire the technical competencies required by modern industries (Zhao and Han, 2024).

Teachers are the cornerstone of this educational transformation (Wang et al., 2024). Their innovative work behavior (IWB)—defined as the proactive initiation and implementation of new ideas, teaching methods, and strategies to enhance educational quality—is essential for

optimizing instructional processes and driving institutional adaptability (Lambriex-Schmitz et al., 2020; AlEssa and Durugbo, 2022). In China, which hosts the world's largest vocational education system, higher vocational colleges supply a substantial proportion of frontline technical talent for modern manufacturing and emerging industries (Kang, 2025). However, innovation practices among higher vocational teachers remain uneven, and persistent mismatches between graduates' competencies and industry requirements continue to be reported (Zhu, 2023; Müller, 2024). Therefore, fostering teachers' IWB in higher vocational colleges is crucial to ensure students acquire the latest skills required by the industries.

Previous studies have explored various factors that influence teachers' innovative work behavior (IWB), identifying both facilitators and inhibitors of IWB (Messmann and Mulder, 2020). Among these, stress-related factors such as work-related stress and role stressors have received increasing attention in recent years (Anjum and Zhao, 2022). Technostress, in particular, has emerged as a critical area of focus, as it may act as a potential inhibitor of teachers' IWB (Chandra et al., 2019; Pansini et al., 2023). The development of technology is not always positive. When confronted with new technologies or technological changes, individuals who perceive themselves as lacking the skills to cope with technologies are more likely to experience stress, leading to technostress (Rohwer et al., 2022). Technostress refers to the psychological burden and difficulties individuals face when adapting to and using new technologies (Wang and Yao, 2025). When individuals encounter overly complex technologies, they may feel helpless and uncertain, making them reluctant to engage in innovative practices. Particularly in higher vocational education, the rapid advancement of technology requires teachers to quickly learn and master a range of new tools, including online teaching platforms, AR or VR technologies, and AI, thereby placing greater demands on teachers' technical adaptability (Liu et al., 2023). Technostress significantly alters teachers' work habits and teaching behaviors, reducing their willingness to adopt innovative technologies in the classroom (Califf and Brooks, 2020), which could inhibit their IWB.

Additionally, role overload may be another key factor influencing teachers' innovative work behavior (Clarke and Higgs, 2020; Huang et al., 2021). Role overload refers to the stress that individuals face when they are required to handle too many responsibilities or tasks while having insufficient resources (such as time and ability) to do so (Rafique, 2023). Higher vocational teachers face intensified and multifaceted job demands that extend beyond traditional classroom teaching, including administrative responsibilities, practical skills training, and engagement in school-enterprise cooperation (Chen and Li, 2024). In China, particularly within the context of industry-education integration in higher vocational education, teachers are increasingly required to engage in

more school-enterprise joint programs, to supervise students during internships, and provide career guidance, all of which further add to their roles (Liu et al., 2018). As a source of role stress, role overload leads to the depletion of an individual's psychological and emotional resources (Apenteng et al., 2022; Malik and Siddiqui, 2022). This depletion can weaken their ability and motivation to participate in innovative activities, which can inhibit teachers' IWB in higher vocational colleges.

To understand these dynamics, the JD-R framework suggests that excessive job demands can lead to a health impairment process. In line with this, COR theory highlights individuals' efforts to obtain and preserve key resources. When resources are depleted by stress, individuals enter a conservation mode, prioritizing routine tasks over resource-intensive activities like innovation (Hobfoll et al., 2018; Lackey et al., 2025).

While previous studies have explored the role of job stressors in IWB, most have emphasized traditional work-related stressors, including time pressure, workload, and task variety, with relatively less attention paid to the impact of technostress and role overload on IWB. Technostress, a critical challenge in digital education (Pansini et al., 2023), has been found to have limited and inconsistent empirical results regarding its effects on IWB. Some studies suggested that technostress hinders innovation and creativity (Hessari et al., 2024; Zhang, 2023), while others indicated a potential non-linear relationship where moderate technostress stimulates innovation, whereas excessive stress impedes it (Panisoara et al., 2020; Chandra et al., 2019). Furthermore, some researchers also argued that some technostressors have no direct impact on IWB (Hurbean et al., 2022). Thus, the relationship between technostress and IWB remains unclear. Additionally, role overload, which is also considered a job stressor for educators (Moore et al., 2021), has not been fully explored in its relationship with IWB. Existing studies provide mixed findings, with some suggesting that role overload may act as a challenging stressor (Lin and Ling, 2018; Chung et al., 2022), while others proposed that it may serve as a hindering stressor by depleting emotional resources and suppressing innovative behavior (Tang and Vandenberghe, 2021; Clarke and Higgs, 2020). Therefore, a theoretical gap exists in understanding the relationship between role overload and IWB, especially in the context of higher vocational teachers. Moreover, how technostress and role overload influence IWB through mechanisms such as emotional exhaustion and intrinsic motivation remains an underexplored area. This study will contribute to filling this gap by examining how technostress and role overload affect IWB among higher vocational teachers, while also identifying the mediating mechanisms at play.

Specifically, this research seeks to examine how technostress and role overload influence teachers' innovative work behavior (IWB) and to explore how emotional exhaustion and intrinsic motivation mediate the

relationships between technostress, role overload, and teachers' IWB. This study aims to offer both theoretical insights and practical implications. This study seeks to extend stress-related theories by examining whether technostress and role overload function predominantly as hindrance stressors that may influence teachers' IWB and identifying the mediating psychological mechanisms. From an educational management perspective, this study aims to provide evidence-based insights for administrators in higher vocational colleges to design targeted strategies and interventions that foster teachers' IWB, ensuring that it meets the demands of the evolving labor market.

## LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

### Job demands–resources theory

The Job Demands-Resources (JD-R) model serves as the foundation of this research, as it is one of the most influential frameworks in management and organizational behavior for explaining how job characteristics influence psychological health and performance (Lesener et al., 2020; Galanakis and Tsitouri, 2022). Job characteristics fall into two categories, namely job demands and job resources (Roskams et al., 2021). Among them, job demands represent the negative aspects of a role that require sustained physical or psychological effort and are associated with specific costs (Bakker et al., 2023). Technostress is considered a job demand because teachers must exert significant effort to cope with rapid technological shifts. Similarly, role overload is viewed as a demand due to the excessive responsibilities and time pressures that result in physiological and psychological strain (Tang and Vandenberghe, 2019). The health impairment process suggests that job demands deplete energy, leading to emotional exhaustion and reduced performance (Bakker and Vries, 2021). This health impairment provides insight into how job demands impact teachers' IWB.

### Conservation of resources theory

To complement the focus of the JD-R model, this study utilizes the Conservation of Resources (COR) theory to explain the dynamic management of stress and innovation (Hobfoll et al., 2018). The fundamental assumption of COR theory is that individuals have an inherent motivation to acquire, protect, and maintain resources so that stress arises when these resources are threatened or lost. A central tenet of this theory is the loss dominance principle, which states that the negative impact of resource loss is significantly more powerful than the positive effect of resource gain (Halbesleben et al., 2014). When teachers face technostress or role overload, the resulting resource

depletion forces them into a 'resource conservation mode'. In this state, they may prioritize routine tasks and withdraw from resource-intensive activities like innovation to prevent further loss (Lackey et al., 2025). This can help explain the negative relationship between hindrance stressors and IWB. Therefore, COR theory elucidates the motivational withdrawal mechanism through which depleted resources undermine intrinsic motivation and innovative work behavior.

### Technostress and innovative work behavior

Technostress is conceptualized as an adaptive issue arising when individuals are unable to effectively cope with or adapt to the implementation of information and communication technologies (ICT) (Nastjuk et al., 2024). This study adopts the widely used definition by Tarafdar et al. (2007), which identifies five core dimensions, including techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty (Pothuganti, 2024). In the educational sector, technostress is viewed as a "modern disease" that alters teachers' work habits and teaching practices, causing anxiety, fatigue, and diminished productivity (Zheng et al., 2024; Ranathunga and Rathnakara, 2022). However, IWB is an autonomously driven and resource-intensive behavior that requires significant cognitive and emotional investment (Zia et al., 2024).

Drawing on the JD-R model, technostress is positioned as a critical job demand that initiates a health impairment process (Pansini et al., 2023). Coping with complex technological systems requires individuals to exert sustained 'physical and/or psychological' effort, which relentlessly consumes their cognitive and emotional resources. According to COR theory, individuals have an inherent drive to protect their valued resources (Hobfoll et al., 2018). When technostress threatens these resources, individuals enter a 'conservation mode', prioritizing routine duties over discretionary, resource-intensive activities like innovation to prevent further loss. High levels of technostress deplete individual psychological resources, weaken cognitive control, and reduce self-efficacy, which in turn increases resistance to innovation (Zhang, 2023).

Teachers experiencing technostress may adopt conservative teaching methods, thereby hindering the adoption of innovative technologies and pedagogical approaches (Califf and Brooks, 2020). Empirical evidence confirmed that technostress, particularly techno-complexity and techno-uncertainty, negatively impacts teachers' innovative behavior (Wu et al., 2022). Without adequate technical support and training, teachers are less likely to experiment with new teaching tools and strategies, which directly affects their willingness to innovate. Therefore, the following hypothesis was proposed:

**H<sub>1</sub>:** Technostress has a negative effect on teachers' innovative work behavior.

## Role overload and innovative work behavior

Role overload is a critical work-related stressor rooted in Role Theory, defined as a condition in which individuals perceive that the volume of tasks, responsibilities, or expectations associated with their professional roles exceeds their available time, abilities, or personal resources (Alyamy and Cheong, 2020). Rather than being an objective measure of workload, role overload is fundamentally subjective, emphasizing the perceived imbalance between external job demands and internal coping capacity (Tang and Vandenberghe, 2021). In the specific landscape of higher vocational education, teachers frequently encounter multiple role demands, simultaneously managing diverse expectations including classroom instruction, academic research, administrative duties, and school-enterprise collaborations (Shan, 2020). This accumulation of roles makes role overload a particularly salient predictor of career stress for teachers (Meng and Wang, 2018).

Within the framework of the JD-R model (Bakker et al., 2023), role overload is conceptualized as a significant job demand that triggers a health impairment process. Because managing excessive responsibilities requires sustained cognitive, emotional, and physical effort, it leads to a decline in individual functioning and mental well-being (Abdou et al., 2024). When teachers are forced to dedicate all their energy to fulfilling basic task requirements and administrative mandates, their 'cognitive space' for creative experimentation is severely constricted (Van Essen et al., 2022). IWB is largely considered an extra-role performance, meaning it is discretionary and highly resource-intensive (Kwon and Kim, 2020). However, role overload can trigger the Behavioral Inhibition System (BIS), leading to withdrawal behaviors that directly suppress the extra-role efforts required for innovation (Huang et al., 2021). Therefore, this study proposed the hypothesis below.

**H<sub>2</sub>:** Role overload has a negative effect on teachers' innovative work behavior.

## The mediating role of emotional exhaustion

Emotional exhaustion, defined as a state of emotional and physical depletion caused by prolonged exposure to excessive job demands, is widely recognized as the core dimension of job burnout (Maslach et al., 2001; Edú-Valsania et al., 2022). Within the JD-R model, emotional exhaustion plays a central role in the health impairment process by transmitting the detrimental effects of job demands to unfavorable work outcomes (Demerouti et al., 2001; Park et al., 2022). Prior studies consistently demonstrate that emotional exhaustion negatively affects innovative work behavior (IWB). Innovation requires sustained cognitive effort, emotional engagement, and

additional time investment, while its outcomes are often uncertain and delayed (Koopman et al., 2016). In line with COR theory, individuals experiencing emotional exhaustion seek to conserve their remaining resources through reducing involvement in discretionary and effort-intensive activities, such as innovation, to avoid further resource loss (Bakker and De Vries, 2021). Empirical evidence reveals that employees who are emotionally exhausted are less likely to participate in innovative practices across organizational contexts (Liang et al., 2022; Gkontelos et al., 2023), including educational settings where emotional exhaustion suppresses teachers' motivation, cognitive flexibility, and engagement in teaching innovation (Jamal et al., 2023).

Technostress and role overload represent two salient job demands that contribute to emotional exhaustion. Technostress, stemming from continuous adaptation to complex information technologies, has been shown to intensify psychological strain, information overload, and emotional fatigue, particularly in environments with inadequate technical support (Wang et al., 2022; Consiglio et al., 2023). In educational management contexts, technostress has been identified as a significant antecedent of teachers' emotional exhaustion, especially under conditions of rapid technological change and digitalized teaching practices (Alvarez-Risco et al., 2021; Bail et al., 2023; Penado et al., 2021). Similarly, role overload reflects excessive work responsibilities that exceed available time and energy, which further accelerates emotional resource depletion and emotional exhaustion (Bourlakis et al., 2023). Taken together, emotional exhaustion is expected to serve as a key mediating mechanism through which technostress and role overload impair teachers' IWB. Therefore, according to the analysis above, this study proposed the following hypothesis.

**H<sub>3</sub>:** Technostress has a positive effect on teachers' emotional exhaustion.

**H<sub>4</sub>:** Role overload has a positive effect on teachers' emotional exhaustion.

**H<sub>5</sub>:** Emotional exhaustion has a negative effect on teachers' innovative work behavior.

**H<sub>6a</sub>:** Emotional exhaustion mediates the relationships between technostress and teachers' innovative work behavior.

**H<sub>6b</sub>:** Emotional exhaustion mediates the relationships between role overload and teachers' innovative work behavior.

## The mediating role of intrinsic motivation

Intrinsic motivation refers to the internal drive to pursue an activity due to inherent interest, satisfaction, or the positive challenge of the task itself, rather than external rewards (Ryan and Deci, 2020; Siyal et al., 2021). Intrinsic motivation has long been seen as an important predictor

of employees' innovative work behavior (Yeap, 2024; Xu et al., 2022). Employees driven by intrinsic motivation continuously seek new and improved methods in their work (Herbiyanti, 2024). Highly intrinsically motivated employees tend to show enhanced cognitive flexibility and sustained effort, which increases their chances of producing creative and unconventional solutions. In educational management contexts, intrinsic motivation has been shown to be positively linked to teachers' innovative work behavior (Chen and Pongtornkulpanich, 2024).

According to COR theory, individuals facing persistent stressors tend to adopt resource protection strategies by reducing discretionary effort and motivational investment to prevent further resource depletion (Verwaeren and Nijstad, 2024). As a core motivational resource, intrinsic motivation is particularly vulnerable to excessive job demands. Technostress functions as a disruptive stressor that induces frustration and anxiety, thereby undermining psychological engagement and weakening intrinsic motivation (Boyer-Davis et al., 2023; Hessari et al., 2024). Empirical evidence suggests that technostress is negatively associated with work motivation across professional and educational settings (Hessari and Nategh, 2022). Similarly, role overload, as a salient resource threat, can trigger negative psychological states and suppress employees' intrinsic motivation by diminishing their sense of autonomy and task enjoyment (Huo and Jiang, 2023).

By eroding teachers' intrinsic motivation, technostress and role overload are likely to indirectly inhibit innovative work behavior. Therefore, intrinsic motivation serves as a key motivational mechanism through which job demands shape teachers' innovative work behavior.

**H<sub>7</sub>:** Technostress has a negative effect on teachers' intrinsic motivation.

**H<sub>8</sub>:** Role overload has a negative effect on teachers' intrinsic motivation.

**H<sub>9</sub>:** Intrinsic motivation has a positive effect on teachers' innovative work behavior.

**H<sub>10a</sub>:** Intrinsic motivation mediates the relationships between technostress and teachers' innovative work behavior.

**H<sub>10b</sub>:** Intrinsic motivation mediates the relationships between role overload and teachers' innovative work behavior.

### Technostress and role overload

Existing research identifies technostress as a significant antecedent that reshapes work processes and role expectations, leading to a direct increase in perceived role stress (Tarafdar et al., 2007). This positive relationship is primarily driven by the complexity and rapid renewal of information and communication technologies (ICT), which create a skill discrepancy and compel employees to

devote excessive time—often extending into personal rest hours—to learning and troubleshooting new systems (Wang and Shu, 2008). These accompanying tasks, such as frequent software updates and extensive information management, often do not directly address core job requirements and thus intensify perceptions of being overwhelmed by excessive responsibilities (Zhang et al., 2025). Moreover, the capacity of ICT to quantify and continuously monitor work outcomes generates relentless organizational expectations for efficiency, fostering a compulsive sense that more must be accomplished within increasingly compressed timeframes (Tarafdar et al., 2007; Wang and Shu, 2008). The resulting demands for constant multitasking and rapid information processing across multiple channels consume vital cognitive and emotional resources, ultimately leading to severe task overload. Consequently, in higher vocational education contexts, when work demands persistently exceed teachers' available time and energy, technostress initiates a process of resource depletion that directly intensifies higher vocational teachers' perceived role overload.

**H<sub>11</sub>:** Technostress has a positive effect on teachers' role overload.

The conceptual model of this study is shown in Figure 1.

## METHODOLOGY

### Participants and data collection

This study targeted full-time teachers employed at six higher vocational colleges in Heilongjiang Province, China. These institutions were undergoing digital transformation and promoting industry-education integration as part of ongoing vocational education reforms. In this context, teachers were expected not only to incorporate digital teaching platforms and emerging educational technologies into their instructional practices but also to assume additional responsibilities related to curriculum reform, skills-oriented training, student internship supervision, and collaboration with enterprises. Such institutional characteristics place relatively high technological and role demands on teachers, making higher vocational colleges an appropriate setting for examining technostress, role overload, and teachers' innovative work behavior. A convenience sampling approach was adopted to recruit teachers who were willing and able to participate in the survey (Creswell, 2014), given the accessibility constraints and the voluntary nature of participation. Data were collected between July and October 2025 using Wenjuanxing, a widely used professional online survey platform in China. A total of 650 questionnaires were distributed, and 607 were returned. After excluding 26 invalid responses, 581 valid questionnaires were retained for final data analysis, yielding a valid response rate of

89.4%. Prior to participation, all respondents provided written informed consent, and participation was entirely voluntary. The study was conducted in accordance with the principles of the Declaration of Helsinki and received

ethical approval from the Ethics Committee of Mahachulalongkornrajavidyalaya University (1 July 2025, R. 466/2025).

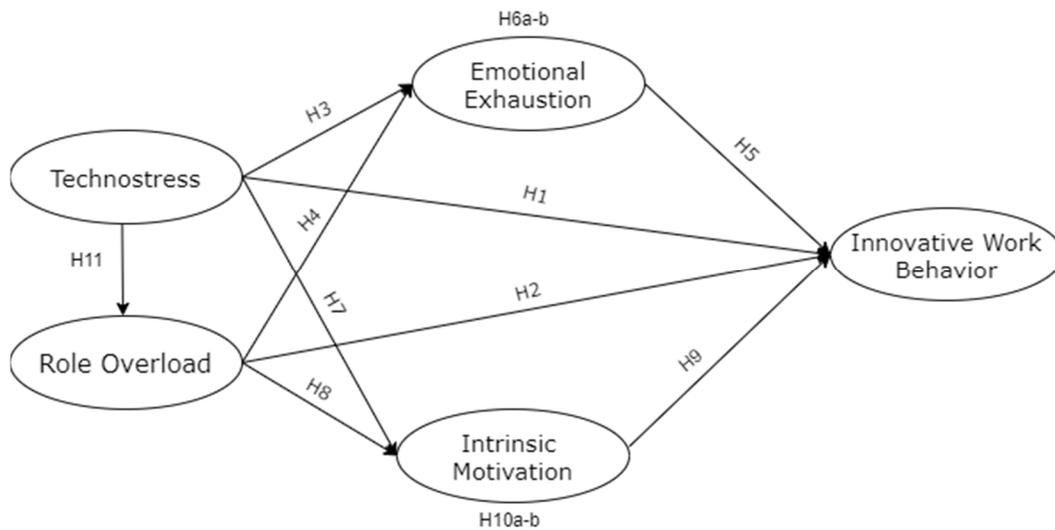


Figure 1. The conceptual model.

Table 1 presents an overview of the respondents' demographic characteristics. Of the sample, 61.96% were female teachers, while males accounted for 38.04%. The majority of participants were aged between 31 and 50 years. Regarding teaching experience, 48.88% reported more than 10 years, and 28.06% had 6 to 10 years. With respect to academic rank, lecturers constituted the largest group (39.93%), followed by associate professors (38.04%). The majority of participants held a master's degree (70.05%), with 21.51% holding a bachelor's degree and 6.88% a doctoral degree. In addition, 76.94% of the respondents occupied non-managerial positions, whereas 23.06% reported holding managerial roles.

## Measure

The measurement items were based on internationally validated scales and were carefully adapted to reflect the Chinese vocational education setting. To ensure linguistic and conceptual equivalence, the original English-language items underwent a rigorous translation and back-translation process.

### Technostress scale

Technostress was measured using a 5-item adapted version of the Technostress Creators Scale developed by

Sharma et al. (2025). All items were rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). A sample item is "I am forced by new teaching technologies to work much faster." In the present study, the scale exhibited satisfactory internal reliability, with a Cronbach's alpha coefficient of 0.889.

### Role overload scale

Role overload was measured using the 5-item scale developed by Peterson et al. (1995). Responses were recorded on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A sample item is "I feel overburdened in my role." In the present study, the scale achieved adequate internal consistency, with a Cronbach's  $\alpha$  value of 0.882.

### Emotional exhaustion scale

Emotional exhaustion was measured using the 9-item Emotional Exhaustion subscale of the Maslach Burnout Inventory-Educators Survey (MBI-ES) developed by Maslach et al. (1981). All items were rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A sample item is "I feel emotionally drained from my work." The scale has demonstrated good reliability with a Cronbach's alpha of 0.908.

**Table 1.** The demographic profile of the respondents (N = 581).

Variable	Category	Frequency	Percentage
Gender	Male	221	38.04%
	Female	360	61.96%
Age	21-30	93	16.01%
	31-40	186	32.01%
	41-50	209	35.97%
	51 above	93	16.01%
Tenure	<1	6	1.03%
	1-5	128	22.03%
	6-10	163	28.06%
	>10	284	48.88%
Academic ranks	Assistant Lecturer	58	9.98%
	Lecturer	232	39.93%
	Associate Professor	221	38.04%
	Professor	70	12.05%
Education level	Associate Degree	6	1.03%
	Bachelor's Degree	128	21.51%
	Master's Degree	407	70.05%
	Doctor's Degree	40	6.88%
Management position	Yes	134	23.06%
	No	447	76.94%

### ***Intrinsic motivation scale***

Intrinsic motivation was measured using the 5-item scale developed by Tierney et al. (1999). All items were rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A sample item is "I enjoy coming up with new ideas for curriculum design or teaching activities." The scale demonstrated good internal consistency in the present study with a Cronbach's alpha of 0.882.

### ***Innovative work behavior scale***

Teachers' innovative work behavior (IWB) was assessed

using the 10-item measurement scale designed by Afsar (2021). Participants responded using a 7-point Likert scale, where 1 indicated "strongly disagree" and 7 indicated "strongly agree". An example item stated, "I search out new teaching methods, techniques, or tools." The reliability of the scale was satisfactory, with a Cronbach's alpha coefficient of 0.926.

As shown in Table 2, all constructs demonstrated satisfactory reliability and convergent validity, with Cronbach's alpha, CR, and AVE values exceeding recommended thresholds (Fornell and Larcker, 1981; Hair et al., 2019).

**Table 2.** Validity and reliability of the scales.

Variables	Number of items	Cronbach's alpha	AVE	CR
Technostress	5	0.889	0.619	0.890
Role overload	5	0.882	0.603	0.883
Emotional exhaustion	9	0.908	0.525	0.908
Intrinsic motivation	5	0.882	0.601	0.883
Innovative work behavior	10	0.926	0.556	0.926

Note: AVE: average variance extracted; CR: composite reliability.

## Data analysis

Statistical analyses were performed using SPSS Statistics 26.0 and AMOS 26.0. Initial analyses included descriptive statistics to summarize the characteristics of the study variables, followed by Pearson correlation analyses to explore their interrelationships. A Harman's single-factor test was conducted to evaluate the potential influence of common method variance. The measurement model was then assessed through confirmatory factor analysis (CFA) to examine the adequacy of the latent constructs. Several goodness-of-fit indices—namely  $\chi^2/df$ , RMSEA, CFI, and TLI—were used to determine overall model fit. Structural equation modeling (SEM) was applied to test the hypothesized relationships among the constructs. Indirect effects were assessed using a bias-corrected bootstrapping approach with 5,000 resampling iterations.

## RESULTS

### Descriptive statistics

Table 3 presents the means, standard deviations, and

intercorrelations among the study variables. Overall, the descriptive statistics indicate adequate variability across constructs, with mean values ranging from 3.398 to 5.194 and standard deviations between 0.729 and 1.442, suggesting no severe restriction of range. Pearson correlation analyses indicated that the study variables were significantly interrelated, with all correlations reaching statistical significance at the 0.001 level. Technostress and role overload were positively correlated with emotional exhaustion and negatively correlated with intrinsic motivation and innovative work behavior. In addition, intrinsic motivation demonstrated a strong positive correlation with innovative work behavior, while emotional exhaustion was strongly and negatively correlated with innovative work behavior. Furthermore, the square roots of the average variance extracted (AVE), reported on the diagonal of Table 3, ranged from 0.725 to 0.787 and exceeded the corresponding inter-construct correlations. This pattern provides support for discriminant validity in accordance with the Fornell–Larcker criterion. The observed correlation pattern is consistent with the hypothesized relationships and provides an appropriate basis for subsequent structural equation modeling analyses.

**Table 3.** Descriptive statistics and correlation matrix.

Variables	M	SD	TS	RO	EE	IM	IWB
TS	4.541	1.442	<b>0.787</b>				
RO	3.496	0.815	.426***	<b>0.777</b>			
EE	3.513	0.729	.579***	.571***	<b>0.725</b>		
IM	5.193	1.346	-.495***	-.413***	-.473***	<b>0.775</b>	
IWB	5.054	1.195	-.553***	-.545***	-.631***	.644***	<b>0.746</b>

Note: M = mean; SD = standard deviation. TS = Technostress; RO = Role overload; EE = Emotional exhaustion; IM = Intrinsic motivation; IWB = Innovative work behavior. N=581, \*\*\*,  $p < 0.001$ , and the diagonal brackets are the square root of AVE value.

### Common method bias test

To reduce the potential impact of common method bias, anonymity was guaranteed during the data collection process. As all five study variables were measured using self-report questionnaires completed by teachers, the possibility of common method variance could not be completely excluded. To preliminarily assess this issue, Harman's single-factor test was conducted by performing an unrotated principal component analysis on all measurement items. The results indicated that five factors had eigenvalues greater than one, and the first factor accounted for 41.242% of the total variance, which is below the recommended threshold of 50% (Podsakoff et al., 2003). These results suggest that common method variance is unlikely to substantially bias the observed relationships in the present study.

### Confirmatory factor analysis

Confirmatory factor analyses (CFAs) were performed prior to hypothesis testing to evaluate the discriminant validity of the constructs. As shown in Table 4, the hypothesized five-factor model—including technostress, role overload, emotional exhaustion, intrinsic motivation, and innovative work behavior—exhibited a good fit to the data ( $\chi^2/df = 1.226$ , CFI = 0.990, TLI = 0.989, RMSEA = 0.020). To further examine discriminant validity, the five-factor model was compared with a series of theoretically plausible alternative nested models in which conceptually related constructs were combined. All alternative models showed substantially poorer fit, as indicated by higher  $\chi^2/df$  values, lower CFI and TLI values, and higher RMSEA values. Chi-square difference tests revealed that each alternative model fit the data significantly worse than the baseline

model ( $\Delta\chi^2$  ranged from 1021.595 to 3157.899 with  $\Delta df$  ranging from 5 to 11, all  $p < .001$ ). These results provide strong support for the discriminant validity of the constructs

and further alleviate concerns regarding construct distinctiveness.

**Table 4.** Model fit results of confirmatory factor analyses.

Model	$\chi^2/df$	CFI	TLI	RMSEA	Model comparison	$\Delta\chi^2$	$\Delta df$
1. Five Factors: TS, RO, EE, IM, IWB (baseline model)	1.226	0.990	0.989	0.020	—	—	—
2. Four Factors: TS+RO, EE, IM, IWB	3.178	0.901	0.893	0.061	2vs1	1021.595	4
3. Three Factors: TS+RO, EE+IM, IWB	5.085	0.812	0.799	0.084	3vs1	2030.762	7
4. Two Factors: TS+RO+EE+IM, IWB	5.809	0.778	0.763	0.091	4vs1	2421.389	9
5. Single Factor: TS+RO+EE+IM+IWB	7.195	0.714	0.695	0.103	5vs1	3157.899	10

Note:  $\Delta$  reflects the variation from the measurement model,  $\chi^2/df$  = chi-square divided by degrees of freedom; RMSEA = Root Mean Square Error of Approximation, CFI = Comparative Fit Index, TLI = Tucker–Lewis Index. TS = Technostress; RO = Role overload; EE = Emotional exhaustion; IM = Intrinsic motivation; IWB = Innovative work behavior.

### SEM analysis

To test the proposed model, structural equation modeling (SEM) was carried out in AMOS, adopting maximum likelihood estimation as the method of parameter estimation. The results indicated a good model fit:  $\chi^2(518) = 642.776$ ,  $p < 0.001$ ,  $\chi^2/df = 1.241$ , CFI = 0.989, TLI = 0.988, RMSEA = 0.02, GFI = 0.940, and AGFI = 0.932. These values met the recommended thresholds, suggesting a good overall model fit. All standardized path coefficients, along with their statistical significance and 95% bias-corrected confidence intervals, were estimated using a bootstrap technique performed with 5,000 iterations.

### Direct effects

With satisfactory overall model fit established, the hypothesized direct relationships were examined. Table 5 reports the standardized direct effects among the latent

variables, which were also depicted in Figure 2.

Regarding job demands, technostress exerted a significant negative impact on innovative work behavior ( $\beta = -0.098$ ,  $p = .036$ ), thereby supporting H1. Role overload was also negatively associated with innovative work behavior ( $\beta = -0.116$ ,  $p < .001$ ), supporting H2. In addition, technostress had a significant positive effect on emotional exhaustion ( $\beta = 0.446$ ,  $p < .001$ ), supporting H3, while role overload further increased emotional exhaustion ( $\beta = 0.427$ ,  $p < .001$ ), supporting H4. Emotional exhaustion, in turn, showed a significant negative effect on IWB ( $\beta = -0.301$ ,  $p < .001$ ), providing support for H5. With respect to motivational pathways, technostress was found to significantly reduce intrinsic motivation ( $\beta = -0.441$ ,  $p < .001$ ), supporting H7, and role overload also negatively predicted intrinsic motivation ( $\beta = -0.263$ ,  $p < .001$ ), supporting H8. Intrinsic motivation was positively related to IWB ( $\beta = 0.431$ ,  $p < .001$ ), thus supporting H9. Finally, technostress had a significant positive effect on role overload ( $\beta = 0.479$ ,  $p < .001$ ), providing support for H11.

**Table 5.** Standardized direct effects with 95% confidence intervals.

Hypothesis	Path	$\beta$	S.E.	C.R.	$p$	Results
H1	TS→IWB	-0.098	0.041	-2.097	0.036	Supported
H2	RO→IWB	-0.116	0.061	-3.795	<.001	Supported
H3	TS→EE	0.446	0.025	9.614	<.001	Supported
H4	RO→EE	0.427	0.038	9.362	<.001	Supported
H5	EE→IWB	-0.301	0.085	-5.829	<.001	Supported
H7	TS→IM	-0.441	0.051	-8.701	<.001	Supported
H8	RO→IM	-0.263	0.074	-5.517	<.001	Supported
H9	IM→IWB	0.431	0.040	9.481	<.001	Supported
H11	TS→RO	0.479	0.031	9.921	<.001	Supported

Note: TS = Technostress; RO = Role overload; EE = Emotional exhaustion; IM = Intrinsic motivation; IWB = Innovative work behavior. Estimates are standardized coefficients. S.E. = standard error; C.R. = critical ratio.  $\beta$  = standardized coefficient.

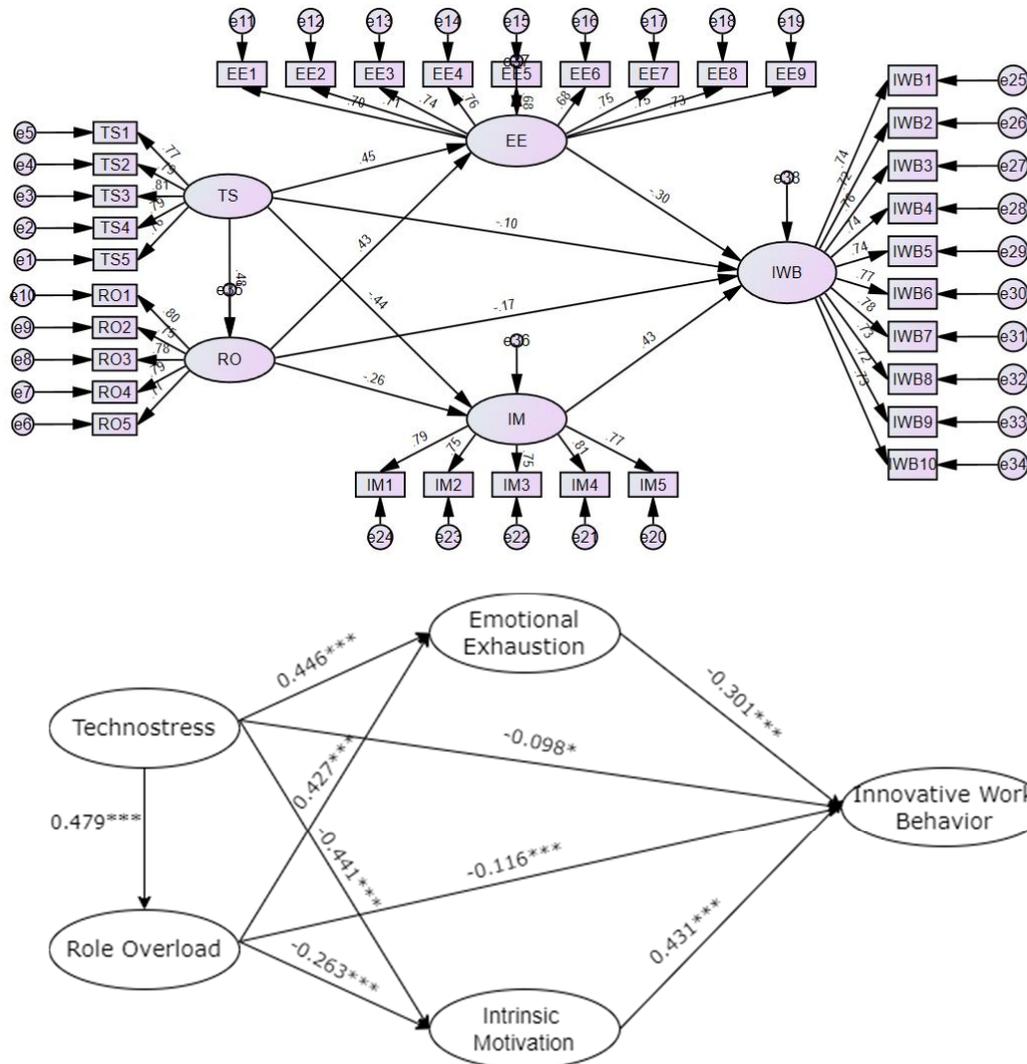


Figure 2. Structural equation model of the hypothesized relationships.

### Indirect effects

This study employed structural equation modeling (SEM) to examine whether emotional exhaustion (EE) and intrinsic motivation (IM) mediate the relationships between job demands—technostress (TS) and role overload (RO)—and innovative work behavior (IWB). To test the proposed mediation effects, bias-corrected bootstrap analyses with 5,000 resamples were conducted. An indirect effect was considered statistically significant when the 95% bias-corrected bootstrap confidence interval (CI) did not include zero. Table 6 reports the standardized indirect and total effects of technostress and role overload on innovative work behavior, together with their corresponding 95% bootstrap confidence intervals. The results provide consistent evidence that emotional exhaustion and intrinsic motivation function as parallel

mediators linking job demands to innovative work behavior.

With respect to technostress, significant negative indirect effects on innovative work behavior were observed through both mediators. Specifically, technostress exerted a negative indirect effect on IWB via emotional exhaustion ( $\beta = -0.119$ , 95% CI  $[-0.170, -0.083]$ ,  $p < .001$ ) and via intrinsic motivation ( $\beta = -0.169$ , 95% CI  $[-0.231, -0.125]$ ,  $p < .001$ ). In both mediation pathways, the total effects of technostress on IWB remained statistically significant ( $\beta = -0.206$  and  $\beta = -0.256$ , respectively;  $p < .001$ ), indicating partial mediation. Similarly, role overload demonstrated significant negative indirect effects on innovative work behavior through emotional exhaustion and intrinsic motivation. The indirect effect of role overload on IWB via emotional exhaustion was significant ( $\beta = -0.178$ , 95% CI  $[-0.250, -0.122]$ ,  $p < .001$ ). In addition, role overload also

showed a significant indirect effect on IWB through intrinsic motivation ( $\beta = -0.157$ , 95% CI  $[-0.230, -0.097]$ ,  $p < .001$ ). The corresponding total effects remained significant ( $\beta = -0.407$  and  $\beta = -0.387$ , respectively;  $p < .001$ ), further supporting a pattern of partial mediation. Thus, H6a, H6b, H10a and H10b were all supported. Overall, these findings indicate that technostress and role overload undermine

innovative work behavior indirectly by increasing emotional exhaustion and reducing intrinsic motivation. Emotional exhaustion and intrinsic motivation thus represent two distinct but complementary psychological pathways through which job demands influence employees' innovative work behavior.

**Table 6.** Standardized indirect and total effects with 95% confidence intervals.

Pathway	Indirect effect ( $\beta$ )	95% confidence interval		$p$	Total Effect ( $\beta$ )	95% confidence interval		$p$
		LLCI	ULCI			LLCI	ULCI	
TS→EE→IWB	-0.119	-0.170	-0.083	***	-0.206	-0.289	-0.126	***
TS→IM→IWB	-0.169	-0.231	-0.125	***	-0.256	-0.350	-0.174	***
RO→EE→IWB	-0.178	-0.250	-0.122	***	-0.407	-0.534	-0.298	***
RO→IM→IWB	-0.157	-0.230	-0.097	***	-0.387	-0.525	-0.260	***

Note:  $n = 581$ .  $p < 0.001$ . Effects are standardized. LLCI = Lower Limit Confidence Interval; ULCI = Upper Limit Confidence Interval. EE = Emotional Exhaustion; IM = Intrinsic Motivation; TS = Technostress; RO = Role Overload. IWB = Innovative Work Behavior.

## DISCUSSION

### Discussion of main findings

This study developed and empirically tested an integrative model to explain how job demands such as technostress and role overload impact innovative work behavior (IWB) among teachers in higher vocational colleges through psychological mechanisms such as emotional exhaustion and intrinsic motivation. Drawing on the JD-R model and COR theory, the findings provided a comprehensive understanding of how innovation among higher vocational teachers is constrained.

Consistent with Hypotheses 1 and 2, both technostress and role overload exerted significant negative effects on innovative work behavior. These findings confirmed that excessive technological demands and accumulated role responsibilities function primarily as hindrance stressors in the vocational education context. The findings are in line with previous studies, which found that technostress depleted cognitive and emotional resources, undermined self-efficacy, and weakened individuals' capacity for innovation (Tarafdar et al., 2007; Zhang, 2023; Hamid, 2024). Similarly, role overload has been widely identified as a key source of strain that suppresses discretionary and proactive behaviors such as innovation (Tang and Vandenberghe, 2021). However, the negative effects observed in this study contrast with findings from high-autonomy or high-skill occupational settings, where moderate levels of technostress or role overload may act as challenge stressors that stimulate innovation (Clarke and Higgs, 2020; Forza et al., 2023). This divergence highlighted the context-dependent nature of stressor–innovation relationships. In higher vocational colleges, where teachers face persistent professional demands

rooted in institutional governance, performance expectations, and evolving skill requirements, job demands are more likely to be perceived as depleting rather than motivating. This study thus demonstrated that identical stressors can yield different innovation outcomes depending on occupational context.

Consistent with Hypotheses 3 and 4, technostress and role overload were found to positively influence emotional exhaustion. This finding aligns with previous studies demonstrating that technological and role demands impose significant psychological burdens across occupations (Michalik and Schermuly, 2023; Li et al., 2025; Kacmar et al., 2020; Alyamy and Cheong, 2020; Rafique, 2023). Drawing on the JD-R model, technostress and role overload can be conceptualized as a set of job demands that deplete cognitive and emotional resources over time, leading to fatigue, frustration, and emotional strain. For higher vocational teachers, the combination of digital transformation pressures and multiple role responsibilities highlights the relevance of these mechanisms. The findings also indicated a negative effect of emotional exhaustion on IWB, supporting H5. Teachers experiencing emotional depletion are less likely to engage in innovation, consistent with COR theory that individuals protect remaining resources by withdrawing from effortful and uncertain tasks (Samma et al., 2020). Hypotheses H6a-b confirmed that emotional exhaustion mediated the relationships between technostress, role overload and IWB. This pattern aligned with the JD-R model and COR theory, highlighting emotional exhaustion as a critical mechanism through which both demands influence innovative work behavior.

Consistent with Hypothesis 7, this study found that technostress has a significant negative impact on vocational college teachers' intrinsic motivation. This result

aligns with existing literature highlighting the detrimental effects of technostress on employees' psychological and motivational states. Empirical evidence from various contexts supports this finding. Hessari and Nategh (2022) reported a significant negative correlation between technostress and work motivation among engineering professionals. Similarly, Boyer-Davis (2023) found that technostress reduced motivation for online teaching among higher education faculty. These studies demonstrate that heightened technostress can erode individuals' willingness to engage in meaningful work. Moreover, research has consistently linked technostress with broader negative outcomes such as burnout, reduced job satisfaction, diminished organizational commitment, decreased productivity, and increased turnover intentions (Jena, 2015; Hessari et al., 2024; Tarafdar et al., 2007; Sharma et al., 2025). As these negative states accumulate, they undermine intrinsic motivation by diminishing enjoyment, interest, and engagement with work tasks.

The results of this study provide empirical evidence that role overload exerts a significant negative influence on intrinsic motivation, supporting H8. One primary mechanism for this negative relationship is explained through the COR theory. According to this framework, individuals strive to obtain and protect valued psychological and physical resources (Hobfoll, 2018). Role overload serves as a primary source of resource drain, so that as job requirements exceed an individual's expectations, they fall into a "vicious spiral" of fatigue and mental exhaustion. To protect their remaining energy, employees often withdraw emotionally from their work (Thomas, 2009), thereby sacrificing the internal drive and curiosity that define intrinsic motivation. Empirical evidence has shown that excessive demands may erode employees' interest-driven engagement, reduce passion for work and creative behavior (De Clercq and Belausteguigoitia, 2018). From a role stress perspective, role overload creates feelings of time pressure and loss of control, which impede individuals' ability to experience enjoyment and inherent satisfaction in their work. The present findings indicated that when teachers are confronted with excessive role expectations and workload demands, their intrinsic motivation is significantly weakened, highlighting the motivational costs of role overload. By directly examining the link between role overload and intrinsic motivation, the present study extends existing research by clarifying how role overload operates not only as a stressor but also as a motivational inhibitor. This finding underscores the importance of managing role demands to preserve teachers' intrinsic motivation and sustain innovative work behaviors.

### **Theoretical implications**

This study offers meaningful theoretical contributions to

the literature on job demands and innovative work behavior by integrating the JD-R model with COR theory. First, this research extends the JD-R framework by empirically identifying technostress and role overload as salient hindrance job demands in the context of higher vocational education, demonstrating that digitally driven and role-related pressures jointly undermine teachers' innovative work behavior. This finding helps clarify the mixed evidence in prior stressor–innovation research by showing that, under conditions of rapid technological change and limited autonomy, job demands are more likely to deplete resources than stimulate innovation. Second, this study advances COR theory by revealing emotional exhaustion and intrinsic motivation as two parallel, resource-based mechanisms through which job demands constrain innovative behavior. Emotional exhaustion reflects the depletion of emotional and cognitive resources, while reduced intrinsic motivation captures teachers' withdrawal of discretionary effort to conserve remaining resources. By simultaneously modeling health impairment and motivational loss pathways, this study provides a more nuanced explanation of how innovation is suppressed, beyond direct stress effects. Finally, by conceptualizing innovative work behavior as a resource-intensive and discretionary activity, this study contributes to educational innovation literature by shifting attention from enabling conditions to psychological constraints. The findings underscore that innovation failure among vocational teachers may stem not from insufficient capability or willingness, but from sustained resource loss caused by excessive job demands, thereby enriching theoretical understanding of innovation under pressure in technology-intensive educational settings.

### **Practical implications**

The findings of this study also provide important practical implications for policy makers, educational administrators, and teachers in the higher vocational education sector. The findings suggested that managing stress-related job demands is a critical prerequisite for promoting teachers' innovation. Excessive technostress can be reduced through systematic technical training, reliable technical support, and clearly defined expectations regarding technology use, which together help lower uncertainty and cognitive overload. Similarly, administrators are encouraged to clarify roles and responsibilities to ensure employees are not "off-tracked" by unrealistic expectations. By ensuring that task assignments align with professional role norms, colleges can prevent the "stress-as-disrespect" that occurs when employees are overwhelmed by illegitimate tasks. Role overload can be mitigated by streamlining administrative procedures, optimizing workload allocation, and granting teachers greater autonomy in instructional and innovation-related activities. By conserving teachers' psychological and

energetic resources, these practices create the necessary conditions for innovative work behavior to emerge. Higher vocational colleges should adopt a dual-path strategy that simultaneously prevents emotional exhaustion and stimulates intrinsic motivation. Emotional risk can be addressed through proactive measures such as mental health screening, confidential counseling, and flexible workload policies. At the same time, intrinsic motivation should be cultivated by embedding meaning, autonomy, and opportunities for competence-building into teaching and research processes. Strategies such as growth-oriented feedback, process-based performance evaluation, and task variety can help sustain motivation even under increasing job demands. The implications also extend to educational governance and policy design. Reducing excessive non-instructional burdens, providing targeted funding for pedagogical and technological innovation, and aligning evaluation and promotion systems with innovation-oriented goals can create a more supportive institutional context for teachers' innovation.

### Limitations and future research

This study has several limitations that suggest directions for future research. First, the sample was drawn exclusively from higher vocational colleges in Heilongjiang Province, China. Regional differences in socio-economic conditions, educational governance, and policy environments may limit the generalizability of the findings. Future studies could extend the sampling scope to other regions, institutional types, or national contexts to test the robustness and boundary conditions of the proposed relationships. Second, this study employed a cross-sectional research design, which restricts the ability to draw causal inferences among the study variables. Future research could adopt longitudinal or time-lagged designs to better capture the dynamic relationships among technostress, role overload, emotional exhaustion, intrinsic motivation, and innovative work behavior over time. Third, all variables were measured using self-reported questionnaires, which may increase the risk of common method bias despite the application of procedural and statistical remedies. Future studies could incorporate multi-source data, such as peer ratings, supervisor evaluations, or objective performance indicators, to reduce bias and improve accuracy. Fourth, the conceptual model focused primarily on job demands, while other potentially relevant job resources were not included, which may limit the explanatory power of the model. Future research could incorporate job resources into this model, such as digital leadership, organizational flexibility, psychological resilience, or learning goal orientation, and to examine potential moderating conditions under which stressors may be perceived as more challenging or hindering, thereby providing a more nuanced understanding of innovative work behavior in educational contexts.

### CONCLUSIONS

Grounded in the Job Demands–Resources and Conservation of Resources theories, this study examines innovative work behavior among higher vocational college teachers in China. The results show that technostress and role overload primarily function as hindrance stressors that undermine teachers' innovative work behavior in higher vocational education. By examining emotional exhaustion and intrinsic motivation as parallel mediators, the study reveals the coexistence of health impairment and motivational pathways underlying teachers' innovative work behavior. Overall, this research offers valuable theoretical and practical insights for educational management in fostering teachers' innovation in high-pressure work environments.

### Conflict of interest

The authors declare no conflicts of interest.

### Institutional review board statement

The study was conducted in accordance with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Mahachulalongkornrajavidyalaya University (1 July 2025, R. 466 / 2025).

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