Psychology Research and Behavior Management

Dovepress

open access to scientific and medical research

Open Access Full Text Article

ORIGINAL RESEARCH

Technostress, Academic Self-Efficacy, and Resistance to Innovation: Buffering Roles of Knowledge Sharing Culture and Constructive Deviant Behavior

Hua Zhang

College of Educational Science, Nanyang Normal University, Nanyang, 473061, People's Republic of China

Correspondence: Hua Zhang, Email huazhang826@nynu.edu.cn

Aim: Scholarly works have primarily found a negative relation between technostress and individual performance outcomes. Nevertheless, there needs to be more empirical research that casts light on the underlying causal mechanism. The current study hypothesizes that technostress affects students' resistance to innovation through the mediating role of academic self-efficacy. Further, the study proposes innovation as a salient goal as a meta-level moderator. To capture this factor, the study investigates constructive deviant behavior and knowledge sharing culture as the buffering agents stimulating these links.

Methods: On a sample of 412 Chinese university students, the authors assess the structural model guided by the social cognitive theory to examine the predictive capability of the hypothesized relationships.

Results: The study found that technostress diminishes students' self-efficacy, which in turn augments resistance to innovation. Besides, constructive deviant behavior and knowledge sharing culture significantly moderate the direct association between technostress and self-efficacy and the indirect relationship between technostress and self-efficacy and then resistance to innovation.

Discussion: The study offers several meaningful theoretical and practical implications related to the critical role of technostress in deteriorating students' self-efficacy beliefs and enhancing resistance to innovation.

Keywords: technostress, academic self-efficacy, resistance to innovation, constructive deviant behavior, knowledge sharing culture

Introduction

Despite institutional efforts to adopt learner-oriented innovation development processes focused on delivering augmented value to the students,[1] many innovation programs face high failure rates.[2] This is bewildering, as scholarly work vis-à-vis innovation adoption has emphasized that relative advantage is a dominant driver of student adoption.[3] Nonetheless, many innovations still face "resistance".[4,5] Research shows variations in resistance to innovation; while the dilemma has not yet received much academic and practitioners' attention, illustrations exemplify the diversity of innovations facing resistance.[6] For instance, MOOCs ("massive open online courses") have become prevalent recently. Predominantly following the outspread of the COVID-19 pandemic.[7] According to Veletsianos and Shepherdson,[8] MOOCs are "an evolving ecosystem of online learning environments that encompass a spectrum of course designs" (p.198). A growing stream of studies reveals that despite the potential benefits of MOOCs, there are several problems with students' adoption and usage.[9] According to Ma and Lee,[4] the MOOCs' dropout rate is very high, and students in developing regions face challenges in its effective adoption. Similarly, other researchers studied the link between digital innovation and students' academic learning.[10] The authors found students' poor academic learning a contingent factor affecting digital innovation resistance.

While the literature on academic innovation is limited, most of these prior investigations have encapsulated contextual factors prompting resistance to innovation.[4,5,10] Nevertheless, there is a shortage of empirical examination from an individual perspective. The study addresses this overlooked phenomenon and predict that technostress triggers resistance to innovation. Our inquiry on the link between technostress and resistance to innovation is novel and significant. The study examines technostress's hitherto understudied adversative role in intensifying students' resistance

Received: 5 July 2023
Accepted: 5 September 2023
Published: 18 September 2023

to innovation. Considering the harmful effects of technostress is essential to determine because it will result in the identifying mechanism underpinning technostress's impact on resistance to innovation.[7] Further, institutional interventions may be taken to mitigate and/or manage this phenomenon. Thus, the current study explores the boundary conditions of the link between technostress and resistance to innovation.

The authors project that technostress augments resistance to innovation through a mediating mechanism: self-efficacy, ie, "the belief that one has the ability to influence the environment through their own actions".[11] First, self-efficacy is highly relevant to technostress because, in general, technostress evokes reduced self-assessments.[7] Second, examining self-efficacy as a mediating mechanism is theory-driven. The author draws on insights from the social cognitive theory,[12] which purports that individuals possess beliefs in their abilities to execute a course of action and influence their environment, ultimately prompting self-efficacy. According to the theory, these beliefs are shaped by task successes and failures, and technostress can be viewed as a task failure experience. Third, self-efficacy explains subsequent behaviors, eg, resistance to innovation. According to Bandura[13] (p. 214),

> [u]nless people believe that they can produce desired effects by their actions, they have little incentive to act or to persevere in the face of difficulties.

In particular, the feelings of not feeling accomplished, ie, diminished self-efficacy, triggered by technostress, elicits meager adoption of innovation. Hence, the authors propose that technostress increases resistance to innovation through an underlying process of depreciated self-efficacy.

Moreover, the study also outstretches the boundary conditions of the technostress and resistance to innovation linkage. This is in response to the call of Gabbidiani et al[7] to explore the boundary effects of resistance to innovation, such as under what conditions the association between technostress and resistance to innovation is more or less likely to occur. Regarding moderators, the study assesses whether innovation is a salient goal as a meta-level moderator. Though prior studies have assessed moderators of resistance to innovation,[4] there is rarely any meta-level framework to theorize different moderators. Whether innovation is a salient goal is one such framework; there is a cushion for multiple moderators to investigate why students would react strongly or weekly to technostress and cultivate resistance to innovation. Namely, innovation and resistance to innovation are contrasting phenomena, so whether innovation is a salient goal would offer a reasonable explanation to accommodate individual and contextual factors underlying this mechanism. The authors anticipate the intervening roles of constructive deviant behavior and knowledge sharing culture as meta-level factors buffering the harmful effects of technostress on resistance to innovation through abridged self-efficacy.

The examination of the interplay between technostress, academic self-efficacy, resistance to innovation, constructive deviant behavior, and knowledge sharing culture is a crucial area of investigation in both educational and organizational settings. Academic inquiries into these dynamics provide the potential to generate significant understandings regarding the intricate interactions among stressors generated by technology, cognitive beliefs of individuals, attitudes towards innovation, and sociocultural impacts. In recent years, a significant amount of scholarly research has consistently demonstrated a detrimental relationship between technostress and individual performance outcomes.[7] For instance, research conducted by Saleem et al[14] has highlighted the adverse effects of technostress on employees' job satisfaction and overall performance, which aligns with the fundamental principle of the proposed framework. Expanding upon the aforementioned basis, Decataldo and Fiore[15] undertook a study inside the context of education, uncovering a noteworthy correlation between technostress and students' subjective perception of their own academic self-efficacy. Nevertheless, additional empirical investigation is required in this field in order to shed light on the fundamental causal mechanisms that underlie these correlations.[7] The current study adopts a proactive approach by suggesting a comprehensive framework based on the social cognitive theory. The aim is to explore the complex connections between technostress, academic self-efficacy, resistance to innovation, and how they are influenced.

Hypotheses

Technostress and Self-Efficacy

Technostress has become a buzzword that integrates stress with technology.[16] Theoretical roots of technostress can be traced in the seminal work of Craig Brod, a clinical psychologist, who coined the term technostress[16] and referred to it as

an ailment caused due to one's inability to deal or cope with "Information and Communication Technologies" (ICTs) in a healthy manner.[17] In a related stream, Arnetz and Wiholm[18] described technostress as a physiological and mental state enthused by technological use and dependency of people blended with the feelings of incapability to cope with technology. The current study provides a framework by drawing on the social cognitive theory that will help practitioners and policymakers buffer technostress's harmful effects by limiting its far-reaching consequences.

Technostress is a multifaceted phenomenon that comprises five sub-factors, namely "techno-overload", "techno-invasion", "techno-complexity", "techno-insecurity", and "techno-uncertainty".[19] Techno-overload reflects situations that require learners to work faster for long hours. Techno-invasion represents the state of invasion that barricades the transition between learning and personal contexts. Techno-complexity involves situations that arouse feelings of inadequacy and discrepancy between technological demands and existing skills. Techno-uncertainty reflects situations caused due to rapid transformations in the ICTs that stretch the differences between current and futuristic skills, inducing feelings of obsolescence. Learners must continuously adapt and learn new skills to understand various aspects of ICTs. Techno-insecurity elicits feelings of insecurity based on the feelings of incapacity and misfit with technology.[20]

An ongoing debate on the link between technostress and self-efficacy has documented inconclusive findings.[21] Tarafdar et al[20,22] argued that the academic literature is uncertain and might elucidate how technostress affects individuals' self-efficacy beliefs. Self-efficacy beliefs and expectations are defined as "a person's perception that he or she has the skill and capability to undertake a particular action or task".[13] Self-efficacy beliefs stem from Bandura's theory of social cognition, which offers a framework for assessing human action, motivation, and thought.[12] There has been an increasing academic interest in examining self-efficacy in formal education settings,[23] beginning with research investigating children's achievement and motivation at schools in the 1980s.[24] Moreover, the conceptual framework of self-efficacy is also commingled with other related constructs, such as self-concept and self-esteem.[25] According to the social cognitive theory,[12,25] people perceive themselves as agentic and believe they may influence their environment. Agentic individuals are usually proactive and deliberate in getting things done through their behaviors.[13] Besides, the theory purports that individuals' agentic actions are determined through their self-efficacy beliefs about their capacities to execute, organize, and plan the courses of effort required to manage probable circumstances.[12] Specifically, their self-efficacy beliefs shape individuals' task confidence. In technological innovation, self-efficacy is directly associated with technology adoption and usage.[26] When self-efficacy is strong, individuals believe they are more capable of shaping their environment, ie, high self-efficacy individuals are more open to technology adoption and utilization.[27]

In addition, the theory posits that individuals acquire self-efficacy beliefs through mastery experiences.[28] According to Bandura,[25] when individuals believe that they can accomplish a task and execute a course of action that leads to a task's success, their confidence in their ability to master that task elicits, fostering their self-efficacy beliefs. On the contrary, the mastery experiences about task failures or critical challenges and obstacles in their way of technology adoption, ascertained by technostress, diminishes their self-efficacy. In this manner, when individuals experience more task failures, they develop lower self-efficacy beliefs in their abilities to perform that task well. Technostress communicates to students that their existing capabilities, skills, and resources cannot overcome technology barriers. Therefore, technostress may be taken by students as a broad signal that perhaps they lack a sound understanding and knowledge of the technology at hand, lack the right mindset for the technology, or lack what it takes to make efficient adoption and familiarity of technology or innovation. As task successes are the keystones of mastery experiences, task failures are missiles that obliterate self-efficacy beliefs. In the similar vein, Govender and Mpungose[29] research highlighted that technostress experienced by teachers also have a trickle-down impact on students, thereby deteriorating self-efficacy. In short, the study expects that:

Hypothesis 1. Technostress is negatively related to self-efficacy.

Self-Efficacy and Resistance to Innovation

Anchored on the social cognitive theory,[12,25] the study projects that self-efficacy should strongly predict innovation. Self-efficacy nurtures innovation because individuals confident in their abilities should be more engaged in innovative endeavors at which they anticipate performing well. Specifically, when individuals believe they possess relevant skills

and abilities to hone the technology and utilize it in their best interests, they become more confident to pursue and navigate the innovation process. On the contrary, individuals are less likely to engage in the innovation process when they believe that such innovations and technological advancements hinder their performance. The absence of high self-efficacy mitigates confidence in one's abilities, making individuals more vulnerable to feeling subdued and intimidated by the determinantal effects of technostress. A massive stream of previous research has linked self-efficacy with improved innovation exposure.[30–32] Nevertheless, the direct relation between high self-efficacy and innovation adoption implies that individuals will more likely resist innovation at low levels of self-efficacy. Thus, the study expects that:

Hypothesis 2. Self-efficacy is negatively related to resistance to innovation.

Technostress, Self-Efficacy, and Resistance to Innovation

The above arguments specify that technostress precedes resistance to innovation, and this overlooked technostress–resistance to innovation link can be explained by self-efficacy. The study relies on the social cognitive theory[12,25] to predict how technostress culminates into resistance to innovation through deteriorated self-efficacy. In the context of technostress, employees' perception of technology as a stressful experience diminishes confidence in their abilities they can comprehend and adapt to intensifying technological demands. Subsequently, reduced levels of self-efficacy result in increased resistance to innovation. Therefore, the study expects that:

Hypotheses 3. Self-efficacy mediates the effect of technostress on resistance to innovation.

Whether Innovation is a Salient Goal

According to the social cognitive theory,[13] task experiences may not necessarily foster self-efficacy. As posited by Bandura[13] (p. 200),

> [t]he impact of information on efficacy expectations will depend on how it is cognitively appraised … For this reason, even success experiences do not necessarily create strong generalized expectations of personal efficacy.

The opposite is also plausible; even failure does not always hinder self-efficacy. The authors speculate that innovation as a meta-level cognitive factor may similarly measure individuals' reactions to failure and mastery experiences. Technostress depletes one's resources and diminishes the ability to accomplish the desired course of action.[7] Nevertheless, whether innovation is perceived as a salient experience, individual level construct: constructive deviant behavior, and organizational level construct: knowledge sharing culture, serve as the intervening factors that buffer the harmful effects of technostress in the pursuit of innovation.

The Moderating Effect of Constructive Deviant Behavior

Although Hanke and Saxberg[33] were the first to use the term constructive deviance, the phenomenon was extensively researched with the total contribution of Galperin et al[34–36] The conceptual roots of constructive deviance share definitional similarity with "dysfunctional" deviance. According to Robinson and Bennett,[37] dysfunctional deviance is volitional behaviors that disrupt institutional norms and endanger its well-being, members, or both. Both forms of deviance: constructive and destructive deviance, imply violations of internal members of an organization rather than its external constituents.[38] Nevertheless, constructive deviance is more beneficial to the organization because it demonstrates prosocial behavior that induces institutional well-being.[39] Besides, researchers have associated constructive deviant behavior with concepts such as role innovation, voice, whistle-blowing, and organizational citizenship behavior (OCB).[35] However, there are significant differences between constructive deviant behavior and related constructs. For instance, constructive deviance induces norm violation in a proactive manner as opposed to OCB, which is passive.[36] Similarly, whistle-blowing engenders disclosure of institutional wrongdoings to external entities, whereas the goal of constructive deviant behavior in violating institutional norms is performance improvements.[35]

The central premise of constructive deviant behavior stems from the bottom-up approach that "identifies and learns from those who manifest exceptional performance based on interest goals".[40] According to this approach, solutions reside within institutional boundaries, which can be identified and executed to solve problems.[38] Further,

this approach presupposes that solutions to the issues prevalent across a wide range of institutions have previously been established and may be found by examining positive outliers before being tested and spread.[41] Despite confronting the same hurdles as others, this approach helps identify standard solutions, leading to success by manifesting different or uncommon behaviors.[35] Such keys are generated internally without intervention by external constituents, implying that these solutions are sustained over time, can be executed with existing resources, and are acceptable to others. A broad agreement corroborates that several unique and innovative ideas are undeveloped due to deviations from the standard ways of doing things.[39] Notably, in the current study context, when learners are exposed to the detrimental consequences of technostress, they perceive that exposure to technostress may be unfavorable and challenging. Consequently, this causes failure in the face of technology, ultimately plummeting one's self-efficacy beliefs. However, when they are allowed to push the boundaries of normalcy and physical routine that leverage constructive thinking, the negative consequences of technostress are abridged. This is in accord with the social cognitive theory;[12] when individuals believe they can execute a desired course of action and turn unfavorable situations into favorable ones by demonstrating "out of the box" thinking, they foster self-efficacy beliefs. Therefore, the study expects that:

Hypothesis 4a. Constructive deviance behavior moderates the link between technostress and self-efficacy, such that the relation is weaker at higher levels of constructive deviance behavior and vice versa.

The Moderating Effect of Knowledge Sharing Culture

In addition, the study also proposes the contextual factor: knowledge sharing culture as an intervening variable to buffer the harmful effects of technostress on self-efficacy. Knowledge sharing is one of the most prevailing processes in knowledge management that should be comprehended, updated, and assimilated to be implemented effectively.[42] Knowledge sharing leverages individuals to yield new experiences[43] that subsidize and enable collective learning, synergy, and creativity, augment innovation, and nurture shared values and standards.[44] Further, knowledge sharing expands the network accessibility of the institution and its members, which results in new process development and execution.[45] Such a culture of knowledge sharing enables individuals to acquire and disseminate knowledge, which synergizes their performance outcomes, provoking creativity and accelerating innovation.[43] According to Swanson et al[46] knowledge sharing engenders individuals' willingness to exchange information (eg, formulas, processes, facts, experiences, ideas) with other members. Knowledge sharing enhances individuals' competitive experiences through exchanging experiences, brainstorming ideas, and practices.[44] Hence, the intervening roles of knowledge sharing culture between technostress and self-efficacy are plausible due to the very nature of knowledge sharing in empowering individuals to hone their skill and expertise to efficiently respond to and comprehend ever-changing technology. Ultimately, knowledge sharing culture cushions individuals to mitigate the adversative effects of technostress on self-efficacy. Therefore, the study expects that:

Hypothesis 4b. Knowledge sharing culture moderates the link between technostress and self-efficacy, such that the relation is weaker at higher levels of knowledge sharing behavior and vice versa.

In addition, hypothesis 3, predicting the mediating role of self-efficacy between technostress and resistance to innovation, and hypotheses 4a and b suggesting the moderating roles of constructive deviant behavior and knowledge sharing culture, lead to the projection of a moderated mediation model. We, thereby, propose that constructive deviant behavior and knowledge sharing culture moderate the harmful effects of technostress on resistance to innovation through the mediating effect of self-efficacy (Figure 1). Thus, the study expects that:

Hypothesis 5a. Constructive deviant behavior moderates the indirect link between technostress and resistance to innovation via self-efficacy, such that the relation is weaker at higher levels of constructive deviant behavior and vice versa.

Hypothesis 5b. Knowledge sharing culture moderates the indirect link between technostress and resistance to innovation via self-efficacy, such that the relation is weaker at higher levels of knowledge sharing culture and vice versa.

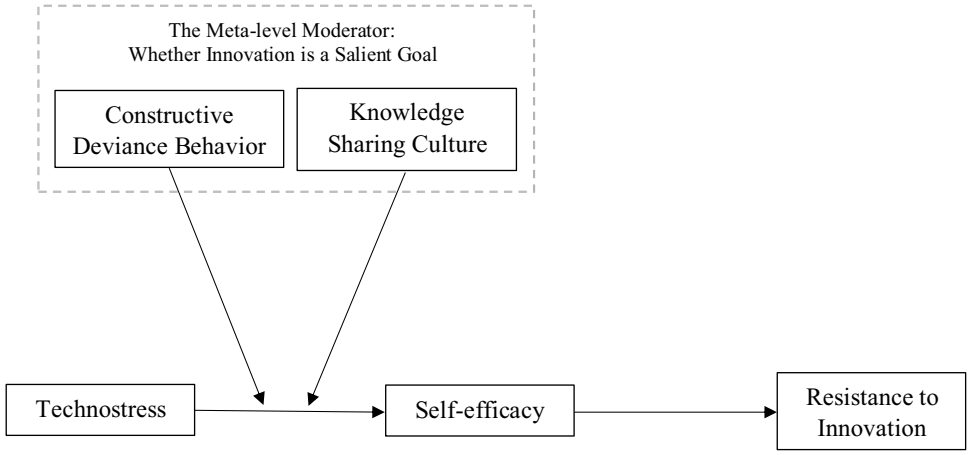

Figure 1 Proposed Theoretical Model.

Methods

Participants and Study Design

The authors conducted a two-phase questionnaire survey by gathering university students' responses in the People's Republic of China. In August 2022 (Phase 1), the study administered questionnaires to 500 students to collect responses for technostress, constructive deviant behavior, and knowledge sharing culture. On the cover letter delivered along with questionnaires, the participants were briefed about the voluntary nature of the survey, and their confidentiality was also assured of minimizing issues related to subjective biases. The corresponding author's contact information was also provided to the participants in case they required any information related to the survey. They were also informed that they could withdraw from participating in the subsequent survey at any time. In addition to the study variables, they were also asked to provide demographic details. With a response rate of 89%, the study received 446 completed questionnaires in Phase 1. After a time interval of two weeks (Phase 2), the second phase of the survey was conducted, and participants were requested to provide information on self-efficacy and resistance to innovation. Using a unique code marked by the participants as instructed in the cover letter, the study identified and consolidated 427 questionnaires. Finally, 412 usable questionnaires were processed in data analysis with a response rate of 82%. The survey sampled 54% and 46% of male and female participants with an average age of 27 (SD 4.021). 52% of participants were in public universities, and 48% studied in private sector institutions. 32%, 46%, and 22% were in undergraduate, graduate, and postgraduate degree programs.

Measures

To empirically assess the proposed relationships in this study, the study assessed data collected from Chinese university students using the structured questionnaire approach. The questionnaire consists of the participants' demographic profiles and research instruments to measure the hypothesized model. All the study measures were adapted from previous studies that were developed in English. Considering the Chinese participants' context, the authors used a back translation procedure recommended by Brislin[47] to create the Chinese version for the measurement scales. All the scale items were measured on a 5-point Likert scale with 1 for strongly disagree and 5 for strongly agree.

Technostress

Using Tarafdar et al's[48] scale, the study determined 23 indicators to assess technostress. The sample items are "I am forced by this technology to do more work than I can handle" and "I spend less time with my family due to this technology".

Self-Efficacy

Using Chen et al's[49] scale, the study determined 8 indicators to assess self-efficacy. The sample items are "When facing difficult tasks, I am certain that I will accomplish them" and ". Compared to other people, I can do most tasks very well".

Resistance to Innovation

Using Hosseini et al's[50] scale, the study determined 8 indicators to assess resistance to innovation. The sample items are "I need to get a solution for some of my complaints and objections before I adopt new technology" and "Innovation is not for me".

Constructive Deviance Behavior

Using Galperin's[35] scale, the study determined 10 indicators to assess constructive deviance behavior. The sample items are "Disagreed with others in your work group in order to improve the current work procedures" and "Departed from dysfunctional organizational policies or procedures to solve a problem".

Knowledge Sharing Culture

Using Connelly and Kelloway[51] scale, the study determined 5 indicators to assess knowledge sharing culture. The sample item is "People with expert knowledge are willing to help others in my institution".

Results

Data Analytical Technique

The authors conducted hypothesis testing and data analysis using variance-based SEM. For this reason, the most widely used analytical tool is PLS-SEM, which social scientists have extensively utilized for the last few decades. PLS-SEM was mainly intended to perform and assess model prediction and theory testing with consistent results for the factor models. To carry out PLS-SEM analysis, the authors used SmartPLS 4 program.[52]

For running PLS-SEM, the authors need to analyze two phases: the measurement and the structural models.[53] Using the latent constructs, indicators' reliability and validity are assessed in the measurement model. After ensuring the indicators' validity and reliability, the second stage of analysis is performed to measure the structural model.

The Measurement Model

In the first stage, the authors examine the measurement model and ensure the reliability and validity of the latent constructs. The analysis reveals the composite reliability / rho_A values to be greater than 0.70, which provides the reliability of these constructs. The investigation further illustrates that resistance to innovation has the highest composite reliability / rho_A (0.926 / 0.889), and knowledge sharing culture has the lowest composite reliability / rho_A (0.812 / 0.776). In addition to the reliability, the validity assessment included the measurement of convergent validity using indicator reliability assessed through outer loading and average variance extracted (AVE) and discriminant validity using the Fornell-Larcker and heterotrait-monotrait (HTMT) metrics. The convergent validity analysis obtained values of AVE and outer loadings > 0.50. The AVE value was highest for constructive deviant behavior (0.646) and lowest for self-efficacy (0.561). Additionally, discriminant validity was determined using the Fornell-Larcker criterion and the HTMT ratio, according to the analysis reported in Table 1, which shows the square root of each construct's AVE < the inter-construct correlation coefficient. The analysis confirms Fornell-Larcker's discriminant validity metric.[54] Further, all the values of the HTMT ratio were obtained

Table 1 Reliability and Validity Assessment

Measures	*Rho_A*	*CR*	*AVE*	*1*	*2*	*3*	*4*	*5*
1. Technostress	0.824	0.854	0.592	*0.769*				
2. Self-efficacy	0.867	0.890	0.561	−0.232	*0.750*			
3. Resistance to innovation	0.889	0.926	0.612	0.242	0.478	*0.782*		
4. Constructive deviance behavior	0.861	0.881	0.646	−0.461	−0.482	0.571	*0.803*	
5. Knowledge sharing culture	0.776	0.812	0.588	0.622	0.610	0.356	0.463	*0.770*

Notes: Values in italics along the diagonal are the square root of AVE; values below the diagonal are inter-construct correlations.
Abbreviations: Rho_A, Cronbach's alpha; *CR*, composite reliability; *AVE*, average variance extracted.

using the bootstrapping procedure, and the analysis revealed values lesser than 0.85.[53] The results of the measurement model assessment are shown in Table 1 and 2 below.

The Structural Model

After validating the measurement model, the study used the bias-corrected and accelerated (BCa) bootstrapping technique (n = 5000) at the 95% confidence interval. The analysis was conducted to examine the coefficient of the structural paths using β and the predictive power of the structural model. In addition, f^2 was used to determine the effect size of the structural paths. The recommended f^2 values are 0.02, 0.15, and 0.35 for small, medium, and large effect sizes.[55] The coefficient of determination (R^2) and predictive relevance (Q^2) were assessed to measure the explained variance in the endogenous variables and the model's predictive capability. The test results reveal the significant relationships among the study variables as all the *p*-values were less than 0.05, and the *t*-values were greater than 1.96. The results show that technostress was negatively related to self-efficacy as the coefficient (β) was −0.451 with 95% BCa < 0.05. This indicates that the hypothesis (H1) was accepted. The results of the effect size analysis indicate a large effect size (f= 0.364). In addition, self-efficacy was negatively related to resistance to innovation as the coefficient (β) was −0.554 with 95% BCa < 0.05. This indicates that the hypothesis (H2) was accepted. The results of the effect size analysis indicate a medium effect size (f^2= 0.204). In addition, the test results for the mediation analysis indicate the complementary mediating effect of self-efficacy between technostress and resistance to innovation. The hypothesis (H3) was accepted as the mediation analysis yielded a significant coefficient (β) of 0.442 with 95% BCa < 0.05. According to Hair et al[53] the significant direct and indirect effects specify complementary mediation effect. This shows that self-efficacy mediates between technostress and resistance to innovation. Further, the effect size analysis result indicates a medium effect size (f^2= 0.182).

Similarly, the study projects the moderating roles of knowledge sharing culture and constructive deviant behavior in these links. The analysis illustrates that knowledge sharing culture buffers the harmful effects of technostress on self-efficacy as the coefficient (β) was 0.336 with 95% BCa < 0.05. This indicates that the hypothesis (H4a) was accepted. The results of the effect size analysis indicate a medium effect size (f^2= 0.262). Moreover, constructive deviance behavior cushions the detrimental effects of technostress on self-efficacy as the coefficient (β) was 0.411 with 95% BCa < 0.05. This indicates that the hypothesis (H4b) was accepted. The results of the effect size analysis indicate a small effect size (f^2= 0.131). Furthermore, the results of the moderated mediation analysis were also supported. The analysis reveals that knowledge sharing culture imposes a moderated mediation effect on the relation between technostress and resistance to innovation via self-efficacy, as the coefficient (β) was −0.392 with 95% BCa < 0.05. This indicates that the hypothesis (H5a) was accepted. The results of the effect size analysis indicate a small effect size (f^2= 0.142). Moreover, constructive deviant behavior significantly intervened in the indirect effect of technostress on resistance to innovation through self-efficacy as the coefficient (β) was −0.345 with 95% BCa < 0.05. This indicates that the hypothesis (H5b) was accepted. The results of the effect size analysis indicate a medium effect size (f^2= 0.178). The results of these analyses are reported in Table 3.

In addition, the authors used the simple slope analysis to produce the graphical representation of the moderated mediation effects of knowledge sharing culture and constructive deviant behavior between technostress and resistance to innovation through self-efficacy. Figures 2–5 show that knowledge sharing culture and constructive deviant behavior significantly moderate the direct and indirect effects of technostress on self-efficacy and resistance to innovation through

Table 2 Discriminant Validity – HTMT Ratios

Measures	1	2	3	4	5
1. Technostress	–				
2. Self-efficacy	0.812	–			
3. Resistance to innovation	0.642	0.791	–		
4. Constructive deviance behavior	0.724	0.711	0.427	–	
5. Knowledge sharing culture	0.581	0.354	0.671	0.681	–

Abbreviation: HTMT, heterotrait-monotrait.

Table 3 Structural Estimates (Hypotheses Testing)

Hypothesis	Standard Beta	Standard Error	*t*-Statistics	f^2	Decision
H1 TS -> SE	−0.451	0.049	8.824**	0.364	Supported
H2 SE -> RTI	−0.554	0.051	9.723**	0.204	Supported
H3 TS -> SE -> RTI	0.442	0.038	6.242**	0.182	Supported
H4a TSxCDB -> SE	0.336	0.062	10.113**	0.262	Supported
H4b TSxKSC -> SE	0.411	0.040	7.292**	0.131	Supported
H5a TSxCDB -> SE -> RTI	−0.392	0.056	3.422**	0.142	Supported
H5b TSxKSC -> SE -> RTI	−0.345	0.073	8.013**	0.178	Supported

Notes: *t*-values; **1.96 (P < 0.05).
Abbreviations: TS, technostress; SE, self-efficacy; RTI, resistance to innovation; CDB, constructive deviance behavior; KSC, knowledge sharing culture.

self-efficacy, such that at high levels of knowledge sharing culture and constructive deviant behavior, the negative impact of technostress on resistance to innovation through self-efficacy are weaker and vice versa.

In addition, the values shown in Table 4 indicate the predictive constructs' explanatory power on each endogenous construct. Latent exogenous variables explained 46% of the variation in self-efficacy (R^2 = 0.459) and 39% in resistance to innovation (R^2 = 0.392). Moreover, the predictive power of the structural model was assessed by following the blindfolding technique. The blindfolding technique yielded a Q^2 value greater than 0, which specifies that the model has predictive relevance.

Discussion

Implications for Theory Development

There are several important implications of our study for theory development. First, the study investigated the overlooked peril of technostress on innovation among university students in China. Only a few studies have associated technostress with innovation outcomes.[20] Specifically, no prior research has investigated the impact of technostress on university students' resistance to innovation. The study empirically investigated the harmful effects of technostress in elevating students' resistance to innovation. By examining technostress as an antecedent of resistance to innovation, the study provides an initial extension to the innovation literature and preliminary add to the scholarly nature and effect of technostress as an undesirable but inevitable experience deteriorating university students' innovation adoption behaviors.

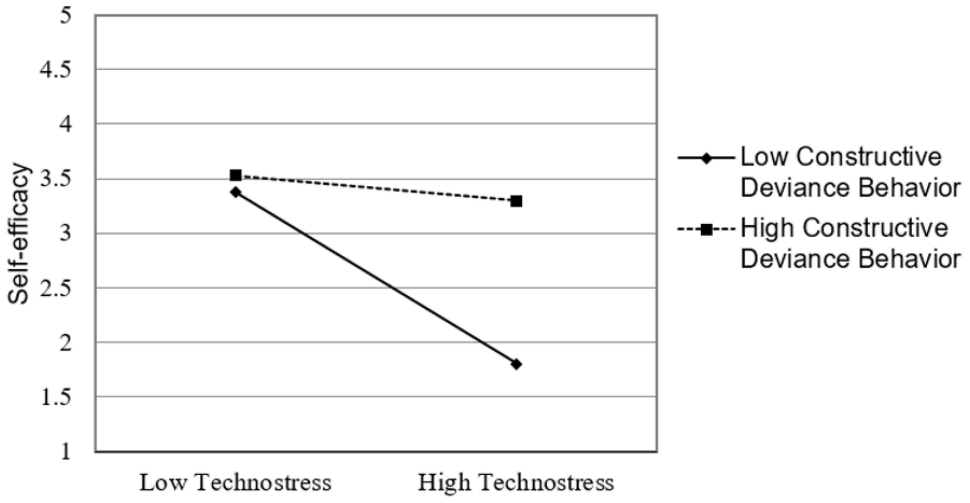

Figure 2 Moderation Effect of Constructive Deviance Behavior.

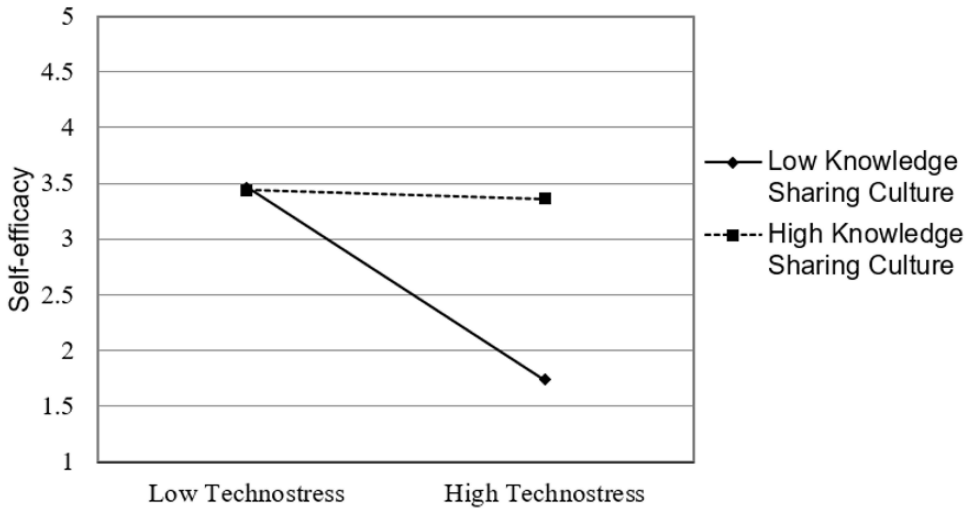

Figure 3 Moderation Effect of Knowledge Sharing Culture.

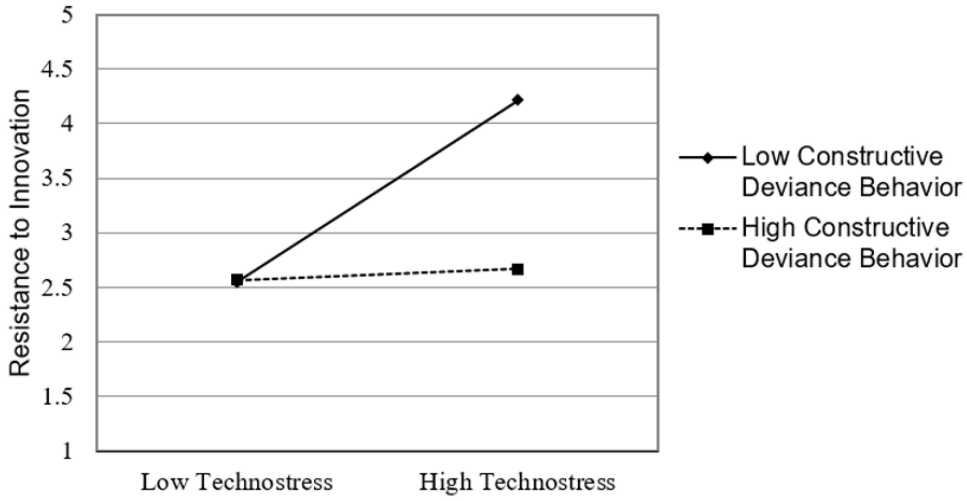

Figure 4 Moderated Mediation Effect of Constructive Deviance Behavior.

Second, our study relied on the social cognitive theory[12,25] and predicted that the harmful effects of technostress in augmenting resistance to innovation are cultivated through individuals' self-efficacy beliefs. To measure this association, the study hypothesizes that technostress is negatively related to the self-efficacy beliefs of university students. That is to say, the exposure to stressful circumstances ascribed by technology: technostress, results in the deterioration of individuals' self-efficacy beliefs. Empirical evidence supports this theoretical assumption, which is in harmony with extant preliminary literature. For instance, Ng et al[45] examined the adversative effects of task failure experiences, such as supervisors' idea rejection, in plunging self-efficacy beliefs. In addition, the negative influence of stressful situations (eg, perceived stress) has also been verified by Guo et al[56] yielding low self-efficacy beliefs among individuals. Moreover, prior research has linked technological self-efficacy[57] and general self-efficacy[58] as a coping mechanism to overcome the adverse roles of technostress. However, there is an increased likelihood that technostress may also affect individuals' task experiences, thereby diminishing their self-efficacy beliefs. The social cognitive theory supports this theoretical deduction that task successes and failures are related to enhancing and reducing self-efficacy beliefs. Therefore, linking self-efficacy as an unfavorable outcome of the adverse effects of technostress in unique and novel.

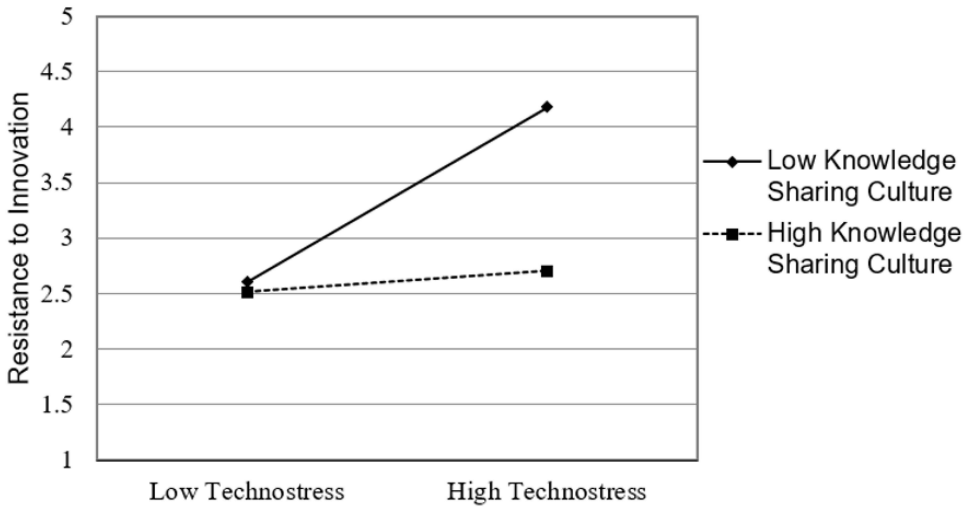

Figure 5 Moderated Mediation Effect of Knowledge Sharing Culture.

Moreover, the author further expects that self-efficacy triggered by technostress transforms into intensified resistance to innovation. Accordingly, the study hypothesizes that self-efficacy is negatively associated with resistance to innovation (Hypothesis 2). The results of our empirical analysis support this hypothesis that reduced levels of foster self-efficacy believe one is incapable of coping with technological issues and challenges, thereby harvesting increased resistance to innovation. Previous studies have linked low self-efficacy with reduced performance, diminished creativity, and depleted innovation behavior.[59,60] Our study thus expands prior research by investigating, for the first time, the mediating role of self-efficacy between technostress and resistance to innovation (Hypothesis 3). The social cognitive theory posits that individuals' negative experiences about technology hamper their ability to adapt to technology, ultimately prompting resistance to innovation.

Fourth, the study hypothesizes whether students perceive innovation as a salient goal as a meta-level moderating construct that intervenes in the technostress–resistance to innovation link. In this study, the study focused on constructive deviant behavior (individual level construct) and knowledge sharing culture (organizational level construct) as a pair to demonstrate the moderating effect of this meta-level construct (Hypotheses 4a and b). Our study found that technostress had weaker adverse effects on self-efficacy for individuals manifesting constructive deviant behavior and thus see innovation as a salient rather than non-salient goal. Similarly, knowledge sharing culture serves as another factor that explains innovation as a salient goal by mitigating the adverse effects of technostress on self-efficacy. This study identified innovation as a meta-level factor and investigated the hitherto unexplored intervening roles of constructive deviant behavior and knowledge sharing culture in buffering the impacts of technostress on self-efficacy. The study further expects that theory development can be expanded based on this meta-level construct by examining other moderators in future studies.

Last but not least, the current study advances the implications of constructive deviant behavior and knowledge sharing culture by examining these variables as the boundary conditions on the indirect link between technostress and resistance to innovation via self-efficacy (Hypotheses 5a and b). Our findings support the intervening roles of constructive deviant behavior and knowledge sharing culture as the results reveal the significant interaction effects of constructive deviant behavior and knowledge sharing culture with technostress on self-efficacy and then resistance to innovation. Such that at

Table 4 Results of R^2 and Q^2 Values

Endogenous Constructs	R^2	Q^2
Self-efficacy	0.459	0.242
Resistance to innovation	0.392	0.421

high levels of constructive deviant behavior and knowledge sharing culture, the relationships between technostress and resistance to innovation via self-efficacy are less pronounced and vice versa. Prior research has shown positive impacts of constructive deviant behavior[36] and knowledge sharing culture[46] on creativity and innovation. Thus, our results align with and extend previous research on the roles of constructive deviant behavior and knowledge sharing culture for individuals' innovative behaviors by scrutinizing their intervening roles in the underlying relationships.

Implications for Managerial Practice

There are several important practical implications of our study for institutions. First, technology unquestionably brings unprecedented benefits to the higher education system, particularly in facilitating a smooth education transition.[61] The benefits include but are not limited to democratizing and enlarging educationists' access to quality education resources, digitization of education, inculcating digital skills in curricula and assessments, and providing learning with personalized and convenient learning experiences.[62] However, technology has been an inadequate integration into education due to its bewildering detrimental consequences in the form of technostress.[17] Our findings validate this corollary that technostress is negatively associated with innovation adoption, eventually levying huge costs to educational institutions.[63] Our hypothesized projections present several ways to cope with technostress. For instance, learners are predisposed to technostress due to a lack of institutional support[64] in maintaining a balance in their education and private lives. As corroborated by Khedhaouria and Cucchi,[65] Raza et al[66] technology has faded the frontier between work and personal spheres, and this invasion is the leading cause of unwilling attitude towards technology and deteriorated mental and physical health. When learners manifest reluctance to technology adoption and behave in manners that impede technology enactment, it tends to be a challenging situation whose implications extend beyond individuals to organizational-level repercussions.[67] Hence, the institutional role is paramount in facilitating the smooth adoption of technology in terms of institutional support. When students perceive that their institutions are trying to mitigate technology-oriented stressors affecting their performance, they will be motivated to actively learn new skills to upgrade their current KSAOs per technological advancements. Organizations should implement necessary interventions to promote their students' physical and mental well-being. Extant research endorses that health and well-being are related to various individual and organizational outcomes.[68]

Moreover, our empirical results validate the intervening role of self-efficacy in the underlying linkages. A wide agreement documents the positive impact of self-efficacy in nurturing individuals' affective and cognitive beliefs and minimizing adversities impacting their performance. In the context of innovation, our study finds that the role of self-efficacy is sine-qua-non for innovation adoption; however, triggered by technostress may harvest resistance to innovation. Educational institutions should consider the critical role of self-efficacy in leveraging innovation adoption. For this reason, the study proposed the moderating roles of constructive deviant behavior and knowledge sharing culture as the elements of innovation: a meta-level factor that cushions the harmful effects of technostress on self-efficacy and then on resistance to innovation. Therefore, institutions should promote constructive (dysfunctional) deviant behaviors, even though such behaviors violate organizational norms. Moreover, a culture of technological knowledge sharing should be encouraged in institutions so that the adverse effects of technostress on self-efficacy and resistance to innovation can be mitigated.

Limitations and Future Research

Although our findings present meaningful insights, yet there are several limitations. First, the study investigated the impact of technostress on resistance to innovation through the mediating role of self-efficacy, with constructive deviant behavior and knowledge sharing culture as moderators. According to the social cognitive theory,[12] task failures and experiences shape self-efficacy beliefs over some time. However, the study measured the study variables using the lagged design. Therefore, the study recommends that future studies adopt longitudinal research designs to capture the phenomenon more appropriately. Second, the study examined self-efficacy belief as the mediating variable. Self-efficacy is one of the four facets of psychological capital, with other constructs including hope, optimism, and resilience.[69] Future studies may encapsulate other factors as the intervening variables to understand the causal mechanism underlying these linkages. Third, the study employed innovation as a salient goal: a meta-level construct focused on constructive deviant

behavior and knowledge sharing culture as the essential moderators. However, future studies may expand the boundary conditions and explore other moderators that may also buffer the harmful effects of technostress on resistance to innovation through self-efficacy. Finally, the author expects that caution should be given in generalizing the study's findings as the results demonstrate the innovation phenomenon of Chinese university students. Thus, future studies may examine the proposed model in different cultural and contextual settings.

Conclusion

The study conducted a two-phase design to measure the association between technostress and resistance to innovation through self-efficacy. Besides, innovation as a salient goal with constructive deviant behavior and a knowledge sharing culture has been identified as the meta-level factor. Theoretical insights are drawn upon the social cognitive theory, and using the Chinese students' sample, the study found that technostress has a negative relationship with self-efficacy, intensifying resistance to innovation. However, constructive deviant behavior and knowledge sharing culture buffer the harmful effects of technostress on self-efficacy and (resistance to innovation via self-efficacy). Several important theoretical and managerial implications are presented in detail.

Data Sharing Statement

The original contributions presented in the study are included in the article, further inquiries can be directed to the corresponding author.

Ethics Statement

The studies involving human participants were reviewed and approved by Nanyang Normal University, China. The participants provided their written informed consent to participate in this study. The study was conducted in accordance with the Declaration of Helsinki.

Disclosure

The author reports no conflicts of interest in this work.

References

1. King LG, McKim AJ, Raven MR, Pauley CM. New and emerging technologies: teacher needs, adoption, methods, and student engagement. *J Agric Educ*. 2019;60(3):277–290. doi:10.5032/jae.2019.03277
2. VanDerSchaaf HP, Daim TU, Basoglu NA. Factors influencing student information technology adoption. *IEEE Trans Eng Manage*. 2021;70(2):631–643. doi:10.1109/TEM.2021.3053966
3. Nayanajith G, Damunupola KA, Ventayen RJ. Impact of innovation and perceived ease of use on e-learning adoption. *Asian J Bus Technol Stud*. 2019;2(1):19–27.
4. Ma L, Lee CS. Understanding the barriers to the use of MOOCs in a developing country: an innovation resistance perspective. *J Educ Comput Res*. 2019;57(3):571–590. doi:10.1177/0735633118757732
5. Zhang D, Akhter S, Kumar T, Nguyen NT. Lack of emotional experience, resistance to innovation, and dissatisfied musicians influence on music unattractive education. *Front Psychol*. 2022;13:922400.
6. Betancor-Falcon S. A critical history of autonomous language learning: exposing the institutional and structural resistance against methodological innovation in language education. *Stud Self Access Learn J*. 2022;13(3):332–346. doi:10.37237/130303
7. Gabbiadini A, Paganin G, Simbula S. Teaching after the pandemic: the role of technostress and organizational support on intentions to adopt remote teaching technologies. *Acta Psychol*. 2023;236:103936. doi:10.1016/j.actpsy.2023.103936
8. Veletsianos G, Shepherdson P. A systematic analysis and synthesis of the empirical MOOC literature published in 2013–2015. *Int Rev Res Open Distance Learn*. 2016;17(2):198–202. doi:10.19173/irrodl.v17i2.2448
9. Badali M, Hatami J, Banihashem SK, Rahimi E, Noroozi O, Eslami Z. The role of motivation in MOOCs' retention rates: a systematic literature review. *Res Pract Technol Enhanc Learn*. 2022;17(1):1–20. doi:10.1186/s41039-022-00181-3
10. Lara-Prieto V, Flores-Garza GE. Iweek experience: the innovation challenges of digital transformation in industry. *Int J Interact Des Manuf*. 2022;16(1):81–98. doi:10.1007/s12008-021-00810-z
11. Bandura A. Self-efficacy mechanism in human agency. *Am Psychol*. 1982;37(2):122. doi:10.1037/0003-066X.37.2.122
12. Bandura A. Social cognitive theory: an agentic perspective. *Ann Rev Psychol*. 2001;52(1):1–26. doi:10.1146/annurev.psych.52.1.1
13. Bandura A. A sociocognitive analysis of substance abuse: an agentic perspective. *Psychol Sci*. 1999;10(3):214–217. doi:10.1111/1467-9280.00138
14. Saleem F, Malik MI, Qureshi SS, Farid MF, Qamar S. Technostress and employee performance nexus during COVID-19: training and creative self-efficacy as moderators. *Front Psychol*. 2021;12:595119. doi:10.3389/fpsyg.2021.595119
15. Decataldo A, Fiore B. Digital-Insecurity and overload: the role of technostress in lecturers' work-family balance. *Ital J Soc Educ*. 2022;14(3):75–102.

16. Brod C. *Technostress: The Human Cost of the Computer Revolution*. Basic Books; 1984.
17. Ayyagari R, Grover V, Purvis R. Technostress: technological antecedents and implications. *MIS Q*. 2011;35(4):831–858. doi:10.2307/41409963
18. Arnetz BB, Wiholm C. Technological stress: psychophysiological symptoms in modern offices. *J Psychosom Res*. 1997;43(1):35–42. doi:10.1016/S0022-3999(97)00083-4
19. Ragu-Nathan TS, Tarafdar M, Ragu-Nathan BS, Tu Q. The consequences of technostress for end users in organizations: conceptual development and empirical validation. *Inf Syst Res*. 2008;19(4):417–433. doi:10.1287/isre.1070.0165
20. Tarafdar M, Cooper CL, Stich J-F. The technostress trifecta - techno eustress, techno distress and design: theoretical directions and an agenda for research. *Inf Syst J*. 2017;29(6):6–42. doi:10.1111/isj.12169
21. Lee YK. Impacts of digital technostress and digital technology self-efficacy on FinTech usage intention of Chinese Gen Z consumers. *Sustainability*. 2021;13(9):5077. doi:10.3390/su13095077
22. Tarafdar M, Pullins EB, Ragu-Nathan TS. Technostress: negative effect on performance and possible mitigations. *Inf Syst J*. 2015;25(2):103–132. doi:10.1111/isj.12042
23. Cai S, Liu C, Wang T, Liu E, Liang JC. Effects of learning physics using Augmented Reality on students' self-efficacy and conceptions of learning. *Brit J Educ Technol*. 2021;52(1):235–251. doi:10.1111/bjet.13020
24. Schunk DH. Self-efficacy and classroom learning. *Psychol Sch*. 1985;22(2):208–223. doi:10.1002/1520-6807(198504)22:2<208::AID-PITS2310220215>3.0.CO;2-7
25. Bandura A. Toward a psychology of human agency. *Perspect Psychol Sci*. 2006;1:164–180. doi:10.1111/j.1745-6916.2006.00011.x
26. Elstad E, Christophersen KA. Perceptions of digital competency among student teachers: contributing to the development of student teachers' instructional self-efficacy in technology-rich classrooms. *Educ Sci*. 2017;7(1):27. doi:10.3390/educsci7010027
27. Wolverton CC, Hollier BNG, Lanier PA. The impact of computer self efficacy on student engagement and group satisfaction in online business courses. *Electron J E-Learning*. 2020;18(2):175–188.
28. Bandura A. A social cognitive perspective on positive psychology. *Rev Psicol Soc*. 2011;26(1):7–20. doi:10.1174/021347411794078444
29. Govender R, Mpungose C. Lecturers' technostress at a South African university in the context of coronavirus (COVID-19). *Cogent Educ*. 2022;9(1):2125205. doi:10.1080/2331186X.2022.2125205
30. Boahene KO, Fang J, Sampong F. Social media usage and tertiary students' academic performance: examining the influences of academic self-efficacy and innovation characteristics. *Sustainability*. 2019;11(8):2431. doi:10.3390/su11082431
31. Carberry AR, Gerber EM, Martin CK. Measuring the innovation self-efficacy of engineers. *Int J Eng Educ*. 2018;34(2):590–598.
32. Schar M, Gilmartin S, Harris A, Rieken B, Sheppard S. Innovation self-efficacy: a very brief measure for engineering students. In: Proceedings for the American Society for Engineering Education Annual Conference; June 25–28; 2017. Columbus, OH.
33. Hanke JJ, Saxberg BO. Isolates and deviants in the United States and Japan: productive nonconformists or costly troublemakers. *Comp Soc Res*. 1985;8:219–243.
34. Galperin BL. Can workplace deviance be constructive? *Misbehav Dysfunc Attitudes Organ*. 2003;2003:154–170.
35. Galperin BL. Exploring the nomological network of workplace deviance: developing and validating a measure of constructive deviance. *J Appl Soc Psychol*. 2012;42(12):2988–3025. doi:10.1111/j.1559-1816.2012.00971.x
36. Robbins DL, Galperin BL. Constructive deviance: striving toward organizational change in healthcare. *J Manage Mark Res*. 2010;5:1.
37. Robinson SL, Bennett RJ. A typology of deviant workplace behaviors: a multidimensional scaling study. *Acad Manage J*. 1995;38(2):555–572. doi:10.2307/256693
38. Gatzweiler A, Blazevic V, Piller FT. Dark side or bright light: destructive and constructive deviant content in consumer ideation contests. *J Prod Innov Manag*. 2017;34(6):772–789. doi:10.1111/jpim.12369
39. Liu Y, Zhang Z, Zhao H. The influence of the COVID-19 event on deviant workplace behavior taking Tianjin, Beijing and Hebei as an example. *Int J Environ Res Public Health*. 2021;18(1):59. doi:10.3390/ijerph18010059
40. Tekmen EE, Kaptangil K. The determinants of constructive deviant behaviour of frontline tourism employees: an exploration with perceived supervisory support and intrinsic motivation. *J Tourism Sustain Wellbeing*. 2022;10(1):58–74.
41. Chiou H, Jopling JK, Scott JY, et al. Detecting organizational innovations leading to improved ICU outcomes: a protocol for a double-blinded national positive deviance study of critical care delivery. *BMJ Open*. 2017;7(6):e015930. doi:10.1136/bmjopen-2017-015930
42. Halisah A, Jayasingam S, Ramayah T, Popa S. Social dilemmas in knowledge sharing: an examination of the interplay between knowledge sharing culture and performance climate. *J Knowledge Manage*. 2021;25(7):1708–1725. doi:10.1108/JKM-08-2020-0631
43. Al-Kurdi OF, El-Haddadeh R, Eldabi T. The role of organisational climate in managing knowledge sharing among academics in higher education. *Int J Inf Manag*. 2020;50:217–227. doi:10.1016/j.ijinfomgt.2019.05.018
44. Arsawan IWE, Koval V, Rajiani I, Rustiarini NW, Supartha WG, Suryantini NPS. Leveraging knowledge sharing and innovation culture into SMEs sustainable competitive advantage. *Int J Prod Perf Manag*. 2022;71(2):405–428.
45. Nguyen TM, Nham TP, Froese FJ, Malik A. Motivation and knowledge sharing: a meta-analysis of main and moderating effects. *J Knowledge Manage*. 2019;23(5):998–1016.
46. Swanson E, Kim S, Lee SM, Yang JJ, Lee YK. The effect of leader competencies on knowledge sharing and job performance: social capital theory. *J Hosp Tour Manag*. 2020;42:88–96. doi:10.1016/j.jhtm.2019.11.004
47. Brislin RW. Back-translation for cross-cultural research. *J Cross Cult Psychol*. 1970;1(3):185–216. doi:10.1177/135910457000100301
48. Tarafdar M, Tu Q, Ragu-Nathan BS, Ragu-Nathan TS. The impact of technostress on role stress and productivity. *J Manage Inf Syst*. 2007;24(1):301–328. doi:10.2753/MIS0742-1222240109
49. Chen G, Gully SM, Eden D. Validation of a new general self-efficacy scale. *Org Res Methods*. 2001;4(1):62–83. doi:10.1177/109442810141004
50. Hosseini MH, Delaviz M, Derakhshide H, Delaviz M. Factors affecting consumer resistance to innovation in mobile phone industry. *Int J Asian Soc Sci*. 2016;6(9):497–509. doi:10.18488/journal.1/2016.6.9/1.9.497.509
51. Connelly CE, Kelloway EK. Predictors of employees' perceptions of knowledge sharing cultures. *Leadersh Org Dev J*. 2003;24(5):294–301. doi:10.1108/01437730310485815
52. Hair JF, Hult GTM, Ringle CM, Sarstedt M, Danks NP, Ray S. *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R: A Workbook*. Springer Nature; 2021.
53. Hair JF, Sarstedt M, Ringle CM, Gudergan SP. *Advanced Issues in Partial Least Squares Structural Equation Modeling*. Sage Publications; 2018.

54. Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. *J Market Res*. 1981;18(1):39–50. doi:10.1177/002224378101800104
55. Cohen J. *Statistical Power Analysis for the Behavioural Sciences*. 2nd ed. Hillsdale, NJ: Lawrence Erlbaum; 1988.
56. Guo J, Yang J, Wiley J, Ou X, Zhou Z, Whittemore R. Perceived stress and self-efficacy are associated with diabetes self-management among adolescents with type 1 diabetes: a moderated mediation analysis. *J Adv Nurs*. 2019;75(12):3544–3553. doi:10.1111/jan.14179
57. Dong Y, Xu C, Chai CS, Zhai X. Exploring the structural relationship among teachers' technostress, technological pedagogical content knowledge (TPACK), computer self-efficacy and school support. *Asia Pac Educ Res*. 2020;29:147–157. doi:10.1007/s40299-019-00461-5
58. Yener S, Arslan A, Kilinç S. The moderating roles of technological self-efficacy and time management in the technostress and employee performance relationship through burnout. *Inf Technol People*. 2021;34(7):1890–1919. doi:10.1108/ITP-09-2019-0462
59. Gkontelos A, Vaiopoulou J, Stamovlasis D. Teachers' innovative work behavior as a function of self-efficacy, burnout, and irrational beliefs: a structural equation model. *Eur J Invest Health Psychol Educ*. 2023;13(2):403–418.
60. Tus J. Self–concept, self–esteem, self–efficacy and academic performance of the senior high school students. *Int J Res Cult Soc*. 2020;4(10):45–59.
61. Almusawi HA, Durugbo CM, Bugawa AM. Innovation in physical education: teachers' perspectives on readiness for wearable technology integration. *Comput Educ*. 2021;167:104185. doi:10.1016/j.compedu.2021.104185
62. Li Q, Bañuelos M, Liu Y, Xu D. Online instruction for a humanized learning experience: techniques used by college instructors. *Comput Educ*. 2022;189:104595. doi:10.1016/j.compedu.2022.104595
63. Harris KJ, Harris RB, Valle M, et al. Technostress and the entitled employee: impacts on work and family. *Inf Technol People*. 2022;35(3):1073–1095. doi:10.1108/ITP-07-2019-0348
64. Solís García P, Lago Urbano R, Real Castelao S. Consequences of COVID-19 confinement for teachers: family-work interactions, technostress, and perceived organizational support. *Int J Environ Res Public Health*. 2021;18(21):11259. doi:10.3390/ijerph182111259
65. Khedhaouria A, Cucchi A. Technostress creators, personality traits, and job burnout: a fuzzy-set configurational analysis. *J Bus Res*. 2019;101:349–361. doi:10.1016/j.jbusres.2019.04.029
66. Raza A, Ishaq MI, Zia H, Ur-Rehman Z, Ahmad R. Technostressors and service employees outcomes: a longitudinal study. *Serv Ind J*. 2022;42(13–14):1030–1053. doi:10.1080/02642069.2022.2081685
67. Salanova M, Llorens S, Ventura M. Technostress: the dark side of technologies. In: *The Impact of ICT on Quality of Working Life*. Dordrecht: Springer Netherlands; 2014:87–103.
68. Heiden M, Widar L, Wiitavaara B, Boman E. Telework in academia: associations with health and well-being among staff. *High Educ*. 2021;81(4):707–722. doi:10.1007/s10734-020-00569-4
69. Lupșa D, Vîrga D, Maricuțoiu LP, Rusu A. Increasing psychological capital: a pre-registered meta-analysis of controlled interventions. *Appl Psychol*. 2020;69(4):1506–1556. doi:10.1111/apps.12219