

PSYCHOSOCIAL IMPACT OF EDUCATIONAL VIRTUALIZATION ON WORK STRESS AMONG UNIVERSITY PROFESSORS IN HUANCAYO, PERU

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Abstract: Educational virtualization has transformed university teaching, increasing technological and cognitive demands with potential effects on faculty well-being. The proposed study focuses on the level of virtualization in teaching and the work-related stress of teachers at a private university in Huancayo, Peru, within the timeframe of 2023-2024. The research design used in the study is quantitative, correlational, cross-sectional, and non-experimental. The sample size consists of 139 individuals selected using the convenience sampling method. To collect the necessary information, the Teacher Work Stress Questionnaire ($\alpha = .900$) was used together with the Educational Virtualization Questionnaire, which was validated by experts and has a reliability value of .781. The set of correlational and descriptive statistics, used in the study and analyzed using IBM SPSS v. 25, suggests a moderate level of positive correlation between the two variables ($\rho = 0.615$; $p < 0.001$), with a significance level of 0.001. Based on the findings, the researchers believe that such a level of virtualization poses an important psychosocial element that justifies the development of customized institutional approaches to provide faculty members with instruction on psychological well-being, technology training, and digital resilience.

Keywords: Educational virtualization; Work stress; Technostress; Digital self-efficacy; Higher education.

INTRODUCTION:

The rapid expansion of educational virtualization has transformed teaching and learning environments in higher education, driven by both technological advancements and the need to ensure academic continuity during global emergencies, such as the COVID-19 pandemic. This process has profoundly reshaped the teaching role, demanding new digital competencies, flexible pedagogical adaptation, and more complex emotional management in response to the challenges of virtual environments (Herrera, 2020; Velásquez, 2020). While digitalization has enhanced flexibility and access to knowledge, it has also increased the cognitive and workload demands on faculty, creating conditions conducive to the emergence of work-related stress and technostress (Tarafdar et al., 2019).

Work stress among university teachers is conceived as a state of physical and psychological tension resulting from an imbalance between academic demands and the personal or institutional resources available to cope with them (Maslach & Leiter, 1997). In the university context, these demands are intensified by digital task overload, the pressure for constant communication, and prolonged exposure to technological devices. According to the Demand-Control-Support model of Karasek and Theorell (1990), the risk of stress increases when job demands are high and perceived control is low. Complementarily, Siegrist's (1996) Effort-Reward Imbalance model proposes that stress arises when the effort invested is not adequately compensated by rewards, generating emotional distress and professional exhaustion. Both frameworks provide a solid foundation for understanding the manifestations of teacher stress in highly digitalized work environments.

From an individual perspective, Bandura's (1986) Self-Efficacy Theory argues that beliefs about one's own abilities influence how job demands are addressed. One study found that teachers with high digital self-efficacy showed greater resilience and lower levels of stress (Valverde et al., 2020), while those with low

self-efficacy reported anxiety, insecurity, and cognitive fatigue. Thus, the psychosocial effects of virtualization are a function not only of the available technology, but of the individual agency and resources that the organization offers in development management.

In Latin America, numerous studies have attempted to link work-related stress with virtual teaching (Alvites, 2019; Velásquez, 2020; Minedu, 2021). However, most studies dedicated to assessing stress symptoms and validating instruments have failed to understand the underlying relationship between teacher work stress and educational virtualization from a correlational and pragmatic dimension. This is a significant gap in our understanding of the phenomenon, particularly in the case of Huancayo, Peru, and similar contexts where technology, institutional support, and public and private university policies diverge considerably.

The advancement of technology in education systems needs to be quantified in relation to the mental well-being of faculty members. This research aims to quantitatively analyze the level of educational virtualization and work stress of university faculty members at a private university in Huancayo, Peru, from 2023 to 2024. The results would help determine the primary psychosocial elements associated with academic digitalization. They would aid in the development of institutional mechanisms to avoid stress and foster well-being and educational improvement. In addition, it incorporates primary work psychology by intertwining classic stress models with new-age technostress and digital self-efficacy stress, in a more elaborate way, in Latin American university environments.

THEORETICAL FRAMEWORK

Work Stress in University Teaching

Work stress in university professors is defined as the physiological and psychological tension related to work that occurs when the expectations placed on a person academically exceed the individual's and institutional resources available to them (Maslach & Leiter, 1997). In the workplace, it is characterized by a combination of physical symptoms, such as fatigue, headaches, and sleep deprivation, and psychological symptoms, including anxiety, agitation, and loss of motivation, in an unsatisfactory manner (Botero, 2012; Alvites, 2019). This problem has deepened as the expectations of the educational world, particularly the technological advancements in distance learning, have left instructors overworked, with unrealistic deadlines, numerous assignments, and limited assistance from the institution. A plethora of studies concur that the aforementioned conditions lead to emotional exhaustion and burnout, a state that undermines job satisfaction and psychological well-being (Velásquez, 2020; Minedu, 2021).

Educational Virtualization and Its Psychosocial Impact

Educational virtualization refers to the relocation of teaching and learning activities in a digital environment, facilitated through advanced Information and Communication Technology (ICT) tools (Cabero-Almenara & Romero-Tena, 2020). The change is not only technological, but also multidimensional, affecting professionals in cultural and pedagogical teaching and learning activities, as well as the transformational nature of the relationship between teacher and student.

While virtualization increases convenience and improves global access to resources, it also leads to adverse effects, including technostress, which manifests as negative responses to technological excess, information overload, and the digital environment (Tarafdar et al., 2019). Clinical studies report higher incidences of stress, anxiety, and burnout among teachers subjected to technological overload and devoid of institutional assistance (Klapproth et al., 2020; Herrera, 2020). The problems are very pronounced in the context of Latin America due to the lack of technological resources and the absence of emotional and mental support. In Peru, reports by Velásquez (2020) and Minedu (2021) show that more than 70% of university faculty faced difficulties with switching to remote work due to severe physical symptoms related to anxiety and stress.

Theoretical Models Explaining Work Stress

Teacher stress has been examined using various psychosocial frameworks. The Demand-Control-Support Model (Karasek & Theorell, 1990) proposes that stress occurs when there are high job demands and a restricted perception of autonomy or control, particularly in the absence of social support. In virtual instruction, excessive digital tasks and poor instructional support are symptoms of this structural imbalance.

Siegrist (1996), in his Model of Imbalance Between Effort and Reward, deepens this understanding by highlighting that stress is a product of an unbalanced relationship between effort and reward. In virtual environments, institutional apathy and a lack of recognition for the effort invested in material development workflows and student support can be highly demoralizing and emotionally draining (Maslach & Leiter, 1997).

From an individual perspective, Bandura's (1986) self-efficacy theory describes how self-beliefs affect the management of work demands. Teachers with high self-efficacy tend to be more resilient and demonstrate less anxiety. In contrast, teachers with low self-efficacy tend to be more insecure and demonstrate higher levels of cognitive overload (Valverde et al., 2020). The Technostress Model (Tarafdar et al., 2019) explores the dimensions of the psychological impact of the use of technology and identifies five: techno-anxiety, techno-fatigue, techno-complexity, techno-insecurity, and techno-invasion. In the presence of rampant hypercapacity with no segmentation between personal and professional domains, these aspects are often present in college teaching, escalating emotional exhaustion. Collectively, these theoretical perspectives explain the

interrelation among individual perceptions, organizational conditions, and technology use in the context of work-related stress in digitalized learning environments.

Relevant Empirical Background

Currently available literature indicates that teaching with technology has increased the stress burden for teachers. In looking at the impact of the transition to distance learning, Klapproth et al. (2020) claim that there was a psychological distress explosion, probably because of the intensified technology use and the absence of proper organizational preparedness. In contrast to the previous study, Salanova, Llorens, and Martínez (2022) indicate that the absence of organizational support and digital resilience tends to alleviate technostress and enhance psychological well-being. In Latin America, Alvites (2019) and Velásquez (2020) point out that the inadequate technological training, coupled with high teaching loads and low organizational recognition, results in a pedagogical stress paradigm. In the context of Peru, the Minedu report (2021) notes that higher rates of virtual work overload, coupled with poor emotional self-regulation, which is almost universal, are found in private educational institutions. This finding illustrates the absence of proper organizational policy responses in these institutions.

Synthesis of the Theoretical Framework

The theoretical and empirical evidence reviewed suggests that educational virtualization is a nuanced psychosocial phenomenon that correlates with the psychosocial well-being of university faculty and their well-being. High technological demands, insufficient autonomy over intertwined digital workflows, a lack of emotional and financial gratification, and a lack of financial and emotional support comprise a set of work stressors known as psychosocial stressors. The central frameworks of Karasek, Siegrist, Bandura, and Tarafdar underpin the intersection of the phenomena's poles of labor, emotion, and technology. However, in the context of Latin America, there is a lack of studies on the particular impacts of stress related to educational virtualization on teachers' work stress. This includes a number of studies, such as the one under review, which took place in Latin America in 2023 and 2024, aimed at providing fundamental contextual evidence to build Digital Resilience and Wellbeing frameworks.

METHODOLOGY

In this study, a quantitative and applied approach was employed that combines non-experimental, cross-sectional, and correlational methods to investigate the relationship between the level of educational virtualization and the work stress experienced by university-level teachers. This approach allowed us to explore the relationship between the two variables without manipulating them, thus maintaining the ecological validity of the data. Between 2023 and 2024, the study population consisted of university professors from a private institution in Huancayo, Peru. In this case, the sample consisted of 139 members obtained through a convenience sampling method, based on the accessibility of the data collection period and the available conditions. The inclusion criteria captured university professors with a minimum of one year of experience in online teaching. Those who performed administrative functions or were on study leave for the duration of the research were not considered for selection.

Educational virtualization was understood as the level of integration of teaching and learning processes with the use of technology in the form of virtual educational and multimedia platforms, as well as online exams and assessments, while teacher work stress was conceptualized as emotional, cognitive, and physiological responses to working conditions characterized by arbitrary and unreasonable demand. The first instrument was the Teacher Work Stress Questionnaire, which has an internal consistency of 0.900. It has been divided into three dimensions: stressors, physical reactions, and psychological reactions. The second instrument was the Educational Virtualization Questionnaire, which has a documented reliability level of 0.781 and was built and validated by evaluation specialists. Assesses the degree of use, integration, and evaluation of pedagogical tools in teaching. Both surveys were used in a remote format via electronic questionnaires to protect respondents' privacy and anonymity.

Respondents provided institutional approval and informed consent, which was obtained from all respondents in accordance with the ethical guidelines of the American Psychological Association (2020) and the Declaration of Helsinki. Participants were given 20 minutes to complete the questionnaires, which were answered asynchronously. Data were analyzed using IBM SPSS Statistics 26. Data analysis was performed using both descriptive and inferential statistics, which involved calculating frequencies, means, and standard deviations, as well as examining the direction and strength of the correlation between the various variables involved in the study using Spearman's correlation coefficient ρ . A p-value of 0.05 was established to test the defined hypotheses. The central hypothesis posits a positive and statistically significant correlation between the degree of educational virtualization and the work stress experienced by university teachers. In addition, specific hypotheses were formulated to assess the relationship between educational virtualization and each level of work stress, including stressors, physical responses, and psychological responses. The findings provide an empirical basis for discussing and interpreting the psychosocial effects of virtualization in relation to university teaching that will follow.

RESULTS

The data were processed using SPSS v25 software, in accordance with the study objectives. The results are presented at three levels: (a) descriptive analysis of work stress and educational virtualization, (b) overall correlational analysis, and (c) analysis by work stress dimensions.

Diagnosis of Work Stress Levels

Table 1 shows the distribution of work stress levels among university teachers. A considerable proportion of participants reported medium and high stress levels, indicating the presence of working conditions that generate tension and emotional overload.

TABLE 1 Work stress levels among university teachers from a private university in Huancayo

S-L	Frequency	Percentage
Low	29	20.9%
Medium	38	27.3%
High	68	48.9%
Very high	4	2.9%
Total	139	100%

Notes. S-L: Stress Level.

As shown in Figure 1, almost half of the teachers (48.9%) presented high stress levels, while 27.3% were at a medium level and 20.9% at a low level. Overall, 76.2% of the sample experienced moderate to high stress, indicating a significant psychosocial risk.

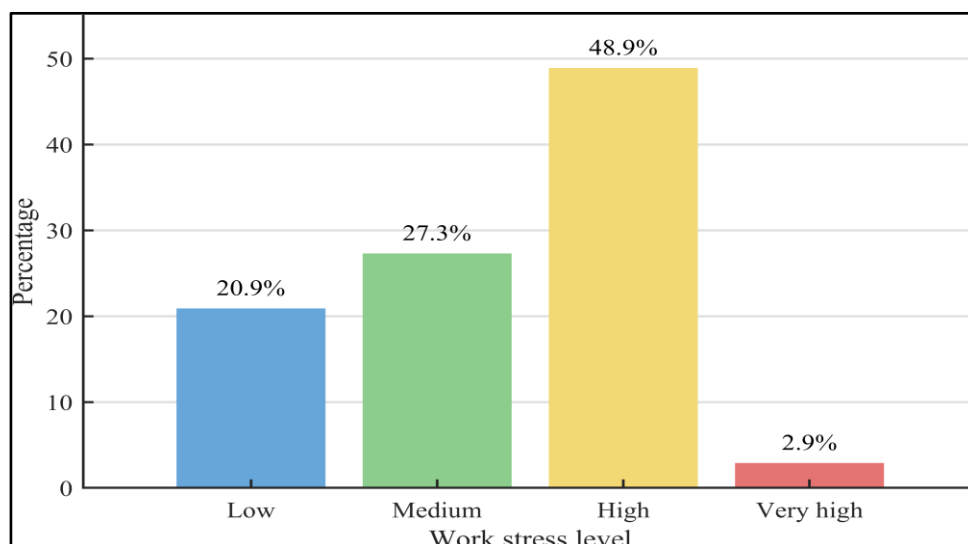


FIGURE 1 Percentage distribution of work stress levels

Note. Bar chart representing the data from Table 1.

These results suggest an imbalance between job demands and available resources, consistent with the Demand-Control-Support model (Karasek & Theorell, 1990). Digital overload, lack of time, and increased administrative duties resulting from virtualization are key factors contributing to higher stress among teachers.

Level of Educational Virtualization

Table 2 presents the distribution of educational virtualization levels. The results indicate a predominance of medium-level responses, suggesting that teachers are in a gradual process of adapting to technology.

TABLE 2 Levels of educational virtualization among university teachers from a private university in Huancayo

V-Level	Frecuencia	Porcentaje
Low	10	7.2%
Medium	79	56.8%
High	50	36.0%
Total	139	100%

Notes. V-Level: Virtualization Level.

Figure 2 shows the percentage distribution of educational virtualization, where more than half of the teachers (56.8%) are at a medium level, 36.0% at a high level, and only 7.2% at a low level.

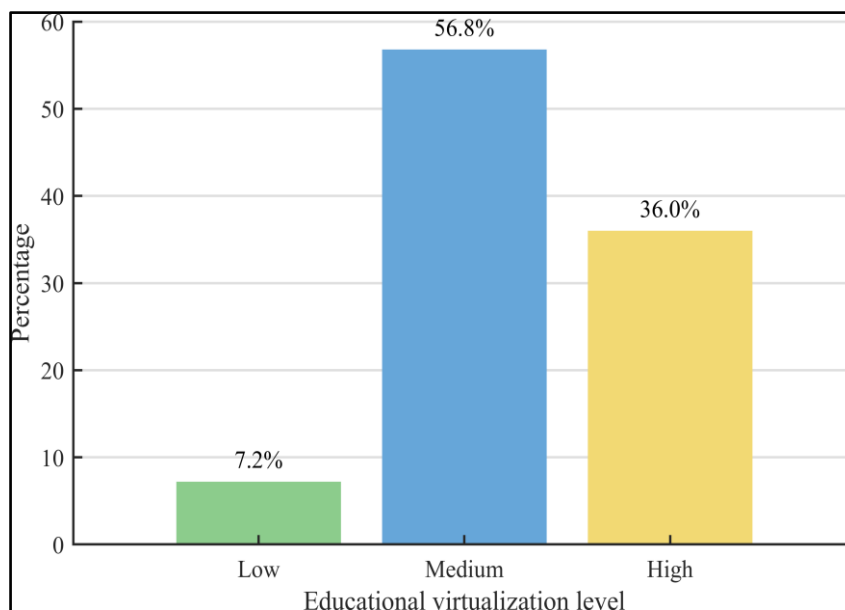


FIGURE 2 Percentage distribution of educational virtualization levels

Note. Graphical representation of Table 2 using a bar chart.

The findings reflect a moderate level of technological integration. However, the high proportion of participants at the medium level indicates the persistence of gaps in digital skills, infrastructure, and institutional support. According to Bandura's (1986) Self-Efficacy Theory, a low perceived control over technology use increases vulnerability to stress, which explains the positive relationship observed between both variables.

Relationship Between Educational Virtualization and Work Stress

The inferential analysis was conducted using Spearman's rank-order correlation coefficient (ρ), since the assumption of normality was not met. Table 3 shows the global correlation between educational virtualization and work stress.

TABLE 3 Spearman's rho correlation between educational virtualization and work stress

Variables	ρ (rho)	P	N
Educational Virtualization - Work Stress	0.615	< .001	139

Note. ρ = Spearman's correlation coefficient; p = level of bilateral significance; N = sample size.

The obtained value ($\rho = 0.615$; $p < .05$) indicates a moderate and statistically significant positive correlation, showing that higher levels of educational virtualization are associated with higher levels of work stress.

The test statistic was calculated as follows:

$$Z_c = \frac{r_s \sqrt{n-1}}{\sqrt{1-r_s^2}}$$

Given that $Z_c = 9.16 > Z_{0.05} = 1.96$, the null hypothesis was rejected, and the alternative hypothesis was accepted, confirming a significant relationship between the two variables.

Correlations by Work Stress Dimensions

Specific correlations between educational virtualization and the three dimensions of work stress were examined. The results, summarized in Table 4, show positive and statistically significant correlations in all cases.

TABLE 4 Correlations between educational virtualization and work stress dimensions (Spearman's rho)

W-K Dimensions	ρ (rho)	P	N
Stressors	0.506	< .05	139
Physical Reactions	0.544	< .05	139

Psychological Reactions	0.463	< .05	139
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Note. W-K = work stress; ρ = Spearman's correlation coefficient; p = level of bilateral significance; N = sample size.

The physical reaction dimension ($\rho = 0.544$) showed the strongest association, indicating that intensive technology use is linked to symptoms such as fatigue, tension, and insomnia. The stressor dimension ($\rho = 0.506$) reflects digital task overload, whereas the psychological reactions dimension ($\rho = 0.463$) captures emotional effects such as anxiety and frustration. The significance test produced Z_c values greater than 1.96 for all dimensions (Z_c (stressors) = 6.89; Z_c (physical reactions) = 7.62; Z_c (psychological reactions) = 6.14), confirming that the correlations were statistically significant.

Overall Interpretation

The results show how educational virtualization profoundly impacts teachers' stress at work and affirm the Demand-Control-Support (Karasek & Theorell, 1990), Effort-Reward Imbalance (Siegrist, 1996), and Self-Efficacy (Bandura, 1986) theories. The rapid advancement of technology, not enough training time, and the institutional need to keep quality standards during digital instruction are relevant psychosocial stressors. Also, the Technostress model (Tarafdar et al., 2019) suggests that teachers' digital self-efficacy influences the levels of techno-anxiety and techno-fatigue they experience, as weaker self-efficacy leads to stronger techno-anxiety and techno-fatigue. These results point to a need for institutional approaches to bolster teachers' digital skills, emotional and technological support, as well as work stress relief in virtualized academic environments.

DISCUSSION

The findings confirmed the general hypothesis, as they revealed a moderate and statistically significant positive correlation between educational virtualization and work-related stress among teachers at Huancayo University in the 2023-2024 academic year. This means that the more the teaching process automates and the more technology is used in the teaching process, the more cognitive, emotional, and organizational strain aggravates psychosocial stress and overwork. These findings align with the results of Velásquez (2020), who, in his research, found that the rush to virtualize education, particularly in settings lacking conducive technology and supportive policy frameworks, led to excessive emotional exhaustion and burnout. Likewise, Klaproth et al. (2020) described the 'digital divide' as lacking sufficient technical assistance and support, as well as increasing the virtual workload, as dominant predictors of teachers' psychological pressure in the university, thereby affirming the stress of virtual work in a catastrophic conjunction.

Contrast with Theoretical Models

The results are consistent with the main theories available on work-related stress. Using the Demand Control Support Model developed by Karasek and Theorell (1990), the combination of high technological and academic demands with low perceived control and limited institutional support creates contexts of psychosocial vulnerability. Teachers who reported high levels of virtualized work and also reported low levels of autonomy or support also reported high levels of stress, suggesting the presence of a structural imbalance between the demands of a given job and the resources available to support it.

Results also support the Effort-Reward Imbalance Model (Siegrist, 1996), where the enduring effort invested in virtual tasks, such as preparing materials, grading asynchronously, and attending to students continuously, does not always lead to adequate reciprocal recognition or rewards. This breakdown of the balance between effort and reward creates frustration, demotivation, and emotional exhaustion, which are characteristic of burnout according to Maslach and Leiter (1997). Moreover, this confirms Bandura's (1986) Self-Efficacy Theory as perceived digital competence impacts the ways teachers manage technology.

In the self-efficacy theory, those with higher self-efficacy tend to be less anxious and have more mastery over their academic activities, while those with lower self-efficacy tend to be more anxious and exhibit learned helplessness. These results support the findings of Deroncele et al. (2021) and Valverde et al. (2020) regarding digital self-efficacy as a determinant of tech nostress levels. Last, there is no doubt that the Tarafdar et al. (2019) technostress model findings are present. Teachers with more exposure to technology displayed symptoms of "techno-anxiety," "techno-fatigue," and "techno-invasion," characterized by muscle tension, inability to sleep, and overall irritability. Uninterrupted digital exposure, as well as a lack of regulation, acts as a psychosocial stressor and heavily harms teachers' emotional and mental health.

Comparison with Recent Research

The outcome of this research aligns with the work of Salanova, Llorens, and Martínez (2022), who found that technological overload and institutional pressure have a negative impact on digital resilience and 11 teaching engagement. In a similar vein, the Peruvian Ministry of Education (Minedu, 2021) reported that over 70% of university faculty members suffered emotional and cognitive difficulties due to intensive virtual instruction. These findings support that teacher stress does not stem solely from self-induced sources, but

from the structural elements of academic work, which include a lack of recognition, insufficient organizational support, and the absence of institutional well-being policies. Moreover, the present findings provide further empirical findings in Latin American contexts and demonstrate that work stress associated with virtualization, and the findings from other work in Europe and Asia, share similar patterns (Klapproth et al., 2020; Zhao et al., 2022). This indicates that the phenomenon is of a global nature and is worse in areas that are deficient in technological and institutional approaches to coping.

Psychological and Practical Implications

Taking an organizational psychology approach, the study's conclusions are pertinent to the management of the university. Developing institutional strategies to prevent technostress, such as stepwise digital literacy, emotional self-regulation, and time management training, is important. Similarly, training self-efficacy, perception of competence, and progressive mastery of digital tools self-advocacy should be the key focus of professional development programs.

Furthermore, higher education institutions must design holistic approaches to organizational well-being that encompass psychological support, emotional well-being, and work-life integration. It is also crucial to promote the active management of balanced and equitable workloads by clearly defining boundaries for connectivity, establishing regular digital disconnection intervals, and ensuring a fair distribution of academic tasks. Ultimately, fostering digital resilience through psychosocial self-regulation, emotional self-regulation, collaborative work, and collective self-efficacy will mitigate the psychosocial impact of virtualization.

Limitations and Future Research Directions

The discussions on the relevance and theoretical justification of the results require more consideration than has been given so far. All the findings stem from data collected from a private university using a cross-sectional design, which allows for the relationship between the variables to be established. Such studies should aim for more longitudinal or mixed-methods approaches and have greater breadth and diversity in the research population, including work from public and rural institutions. This should encompass more complex constructs, such as frameworks of digital self-efficacy, social support, and coping mechanisms, as well as mediational or moderational roles. Additionally, the relationship between institutional leadership and organizational climate, as well as the psychosocial aspects of virtual education, would be interesting to investigate as moderating variables.

The synthesis of theory with the data collected offers a phenomenological duality to 'the virtualization of education'. Educational virtualization encourages innovative pedagogical practices, flexible teaching methodologies, and the fundamental acquisition and development of digital skills. Simultaneously, the virtualization of education increases the cognitive, technological, and emotional costs that, if neglected on the individual and institutional levels, may lead to professional stress and burnout. Such evidence, drawn from the context of a Peruvian university, illustrates the problem of underestimated digital self-efficacy, an asymmetry between burnout and the effort-stress relationship, and the additional unbalanced effort contributions to teachers' work stress. Yet, psychosocial policies framed by notions of digital well-being and technological self-efficacy at the university level are critical in sustaining a developed, humane academic framework in the context of contemporary challenges of virtual education.

CONCLUSION

According to the research findings, the educational virtualization process affects the level of stress experienced by university-level students. Teachers, due to cognitive, emotional, and organizational overloads stemming from the digital devices, work beyond the workload, and the pressure from the institution to maintain the level of continuity of academic excellence in the virtual environment. This tells us that while digitalization serves the purpose of enhancing the effectiveness and efficiency of teaching, it raises the psychosocial risks due to the absence of a positive, balanced, and sustainable approach from the organizational standpoint. The study advances the body of knowledge pertaining to higher education in Peru. Furthermore, the study reinforces the theoretical constructs of the Demand-Control-Support model and the Effort-Reward Imbalance, Self-efficacy, and Technostress Models. It highlights that technologically driven, due to unrequited effort and passive low autonomy, as well as lethargy, low-controlled Quasi-Relational Stress is a strong predictor of stress.

The research builds upon additional integrations for the phenomenon, which in the current academic environment combines organizational, individual, and technological dimensions, in order to foster greater understanding. The findings support the need to improve the institutional management of teachers' mental health. Policies to reduce technostress need to be accompanied by psychological support systems, as well as proactive training programs that strengthen digital self-efficacy and digital resilience. The provision of protective psychosocial environments, through the integration of psychosocial risk factors, cultivating positive psychosocial safety, is a key condition for well-being at work, which in turn is a precursor to the sustainable continuity of the university education system. Appropriately, this work suggests the need for more studies in the realm of occupational psychology and higher education in the post-pandemic setting, and the influence of technology on psychological health and motivational levels of the teachers. Equipping a teacher to work

within a social-emotional and mental health network, which is a construct of a digital space, is more than just competency with a gadget. It is multidimensional and characterized by collaborative pedagogy, which prioritizes a practitioner's well-being and work-life balance.

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