

Technostress and Remote Teaching: Assessing Their Influence on Teachers' Work-Related Well-Being During the COVID-19 Pandemic

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Following the outbreak of the COVID-19 pandemic, one of the first measures implemented in Italy was the transition from frontal teaching to online teaching. The sudden need to use technologies to perform their job has added a source of stress to teachers' work: so-called technostress. The difficulties experienced in this transition may also have affected the perception of work-related well-being, although other variables, such as the perception of the meaningfulness of work, could alleviate this sense of uneasiness. The study aims to examine the relationships between technostress, online teaching, pleasure in working, and meaningful work perceptions among 219 teachers from different school grades through a moderated mediation model. The results confirm negative associations between technostress and pleasure in working, although this relationship varies according to the levels of perceived meaningfulness. Analyzing the factors related to teachers' perceptions of their work, both in general and during the pandemic situation, is useful for tracing new coping strategies and planning interventions to implement new teaching methods. Further implications concerning the protective role of meaningful work are discussed.

Keywords: Well-Being; Technostress; Online Teaching; Meaningful Work; Teachers; COVID-19

INTRODUCTION

Teaching can be included among the professions that have suffered most from the effects of the COVID-19 pandemic (Williamson et al. 2020). The sudden implementation of the lockdown measures imposed by several governments has affected many professional categories, changing the way people interact with their

work in everyday life, and has certainly led to great physical, psychological, and social deprivation (Giorgi et al. 2020; Rossi et al. 2020). In the case of teachers, it was only possible to maintain with great effort the aspect of the work that involves the transmission of knowledge, in particular during the initial and more difficult phases of the lockdown (Giovannella et al. 2020). However, the greatest difficulties have been experienced in the attempt to comply with all the social aspects that support the learning process, including maintaining the attention and motivation of students (Williamson et al. 2020). Several studies, based on research from before the pandemic period, revealed that online learning can offer advantages to students over face-to-face education, on parameters such as levels of knowledge, satisfaction, learning styles, and study habits (Paulsen and McCormick 2020). However, these are studies that compare two different types of teaching activities based on precise choices of teachers, and not based on an emergency need. The success of online student engagement seems to be influenced by several psychosocial factors, such as being in front of an engaging teacher, and by other structural factors, such as course design (Farrell and Brunton 2020). In contrast, during the pandemic situation, millions of teachers around the world suddenly found themselves having to rethink and reorganize how they carry out their work (Williamson et al. 2020). This has happened without any planning or preparation, and as a result has led to forms of psychosocial stress, although some studies yielded controversial results regarding these consequences. While several studies identify teachers as one of the categories most affected by stress and burnout during the pandemic (Pelly et al. 2022; Shoman et al. 2021; Lizana and Lera 2022), in a study conducted by Herman et al. (2021), teachers reported lower levels of work-related stress after the onset of the pandemic than their pre-pandemic levels. This research revealed that teachers' confidence in their ability to manage student behaviors is a strong predictor of teachers' perceived well-being, drawing attention to individual characteristics and the need to investigate individuals' general attitudes towards facing challenges.

Therefore, this study aims to evaluate the subjective perception of online teaching and the relationships that link this variable to factors specifically related to it (such as the stress deriving from the use of technology) and to factors related to work in general (such as the meaning given to one's work and the pleasure in working).

Technostress

The forced transition from face-to-face to remote teaching has highlighted the technology problem, which is hardly inclusive. Large percentages of students and teachers were deprived of a positive experience related to online education during the pandemic period due to a lack of adequate technology (Williamson et al. 2020). This may have led to a specific type of stress due to the mandatory use

of technology: so-called technostress. It is caused by having to deal with constantly evolving technologies and the need to adapt to new work models and greater technological skills (Tarafdar et al. 2007; Ragu-Nathan et al. 2008). According to Tarafdar et al. (2007), technostress is made up of several sub-dimensions, for example: techno-overload, related to the need to work faster, multitask, or change work habits; techno-invasion, related to the ability of technologies to invade users' personal lives and blur the boundaries between work and private life; and techno-complexity, related to the feelings of inadequacy of users concerning their skills. Therefore, technostress may result in perceived work overload, frustration, fatigue, and job dissatisfaction (Ragu-Nathan et al. 2008; Tarafdar et al. 2010). In the school environment, several variables closely related to technology have been identified that could undermine teachers' work-related well-being. For example, insufficiency of technological literacy, limited access to technology, internet-related problems, and difficulty in classroom management in the online environment (Aktan and Toraman 2022).

In the pre-pandemic period, technostress had already been linked with symptoms such as anxiety, fatigue, loss of motivation, burnout, job dissatisfaction, and low quality of life (Tarafdar et al. 2007; Tarafdar et al. 2010; Srivastava et al. 2015; Suh and Lee 2017). During the pandemic period, the associations between technostress, specifically the sub-dimensions of techno-overload and techno-insecurity, and outcomes such as job dissatisfaction (Aktan and Toraman 2022), strain, and perceived job performance (Camacho and Barrios 2022) have been confirmed. The negative relationship between technostress and job performance in a sector such as education is particularly dangerous as the students pay the price. Therefore, looking for factors that can alleviate these effects can be particularly important.

In the present study, we hypothesize that technostress may have a mediating role in the relationship between the perceptions related to online teaching and the pleasure experienced in working, as online education has necessarily led to the intensive use of technologies and these, in turn, are negatively related to job satisfaction (Aktan and Toraman 2022).

Hypothesis 1. Technostress mediates the relationship between online teaching and pleasure in working.

Meaningful Work and Its Effects on Work-Related Well-Being

Perceiving one's work as meaningful has been identified as a job resource capable of predicting job satisfaction, positive job performances, and engagement (Wrzesniewski et al. 2003; Stager et al. 2012; Bakker and Demerouti 2017; Pace et al. 2022), especially in people-oriented professions. When there is a correspondence between the individuals' value system and the values that work allows them to express, the work can be perceived as meaningful, and people are

more willing to carry out work activities if they believe that they are worth their time and energy (Stager et al. 2012).

In times of crisis, this motivation is essential. A study conducted during the peak years of the COVID-19 pandemic on frontline health workers (Liu et al. 2021), who are likely the most burdened by the pandemic, showed that individuals with low perceptions of meaningfulness associated with their work were far less engaged than colleagues who perceived their work as meaningful.

As regards the education sector, studies on the meaningfulness of work are limited. Yet, assessing the meaningful work among teachers can be particularly interesting since the teaching profession is characterized by some features potentially associated with significance. As Minkkinen and colleagues (Minkkinen et al. 2020) write, meaningful work can be associated with a sense of empowerment, which can result from enriching students' lives; a sense of fulfillment, given by the ability to make a difference in students' lives; an alignment between personal and professional values; the possibility of expressing creativity in the execution of one's work; and finally, the possibility of creating meaningful relationships.

In the pre-pandemic period, several studies have found a link between meaningful work and positive work outcomes, such as happiness, psychological well-being, and job satisfaction (Willemse and Deacon 2015; Van Wingerden and Stoep 2017; Ugwu and Onyishi 2018; Allan et al. 2019; Minkkinen et al. 2020). For example, the study by Ugwu and Onyishi (2018) revealed that teachers with high levels of meaningfulness and a high sense of calling showed significantly higher levels of work engagement than colleagues with low meaningfulness and sense of calling, even in conditions of high organizational frustration. Therefore, even in the presence of potentially stressful and challenging working conditions, the sense of meaning associated with one's work can ensure positive working behavior. This is extremely relevant, as teachers with work-related positive attitudes may be better able to provide quality education (Willemse and Deacon 2015).

It has also been shown that meaningful work can mitigate the effects of work-related stressors on teachers' self-rated health (Minkkinen et al. 2020). Even a work environment characterized by many distractions and demanding work tasks can become less detrimental to the well-being of workers if they ascribe a strong sense of meaning to their work (Minkkinen et al. 2020).

Therefore, we hypothesize that:

Hypothesis 2. Perceiving one's work as relevant and meaningful to oneself and others could help mitigate the negative effects of technostress on the pleasure in working.

The hypothesized model is represented in Figure 1.

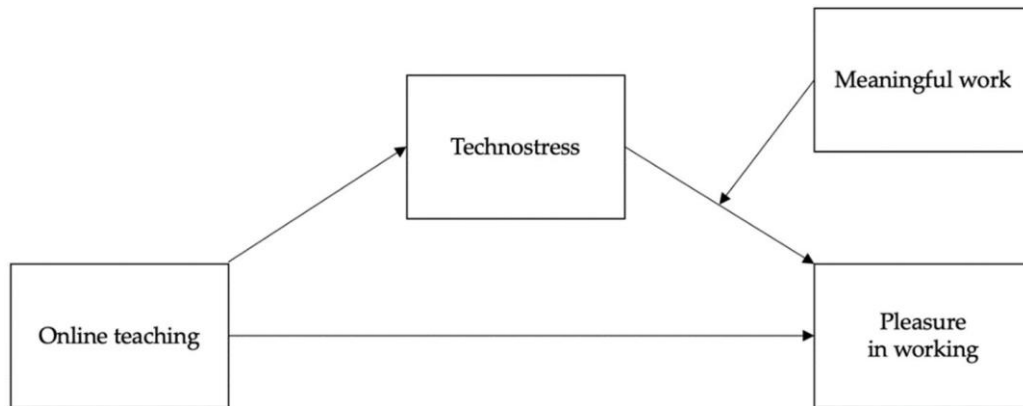


Figure 1. The hypothesized moderated mediation model.

MATERIALS AND METHODS

Participants

The research population consists of 219 Italian teachers, contacted through an email containing information on the research objectives and data processing methods, the informed consent documents, and the link to the online questionnaire. Data were collected through a snowball sampling procedure between October 2021 and March 2022. The response rate was about 60%. Overall, 76.3% are female and 23.7% are male. The mean age is 47.6 years old ($SD = 9.2$), in a range between 22 and 67 years old. The sample is made up of 6.8% of kindergarten teachers, 32.9% of primary school teachers, 40.6% of middle school teachers, 16.9% of high school teachers, and 2.8% of comprehensive school teachers. A total of 20.5% of them have worked as teachers for less than 1 year, 39.7% have worked from 1 to 8 years, 12.3% have worked from 8 to 14 years, and the remaining 27.4% have worked for more than 14 years.

Measures

Online teaching perceptions were assessed using 7 items extracted from Muñoz-Chávez et al. (2022) Teachers' Burnout and Online Education scale. The scale measures teachers' feelings of emotional exhaustion, depersonalization, and personal accomplishment related to the online education process that became necessary during the COVID-19 pandemic. Examples of items include "Working online with students causes me stress" and "I feel that I get a lot of valuable things out of online education". All items were assessed using a 4-point Likert scale ranging from 1 = strongly disagree to 4 = strongly agree. Higher scores indicate

higher feelings of discomfort towards online teaching. Cronbach's alpha in this study is 0.79.

Technostress was assessed using 4 items from the Technostress Scale of Camarena and Fusi (2022). The scale investigates whether the use of technologies increases employees' stress at work, considering the dimensions of techno-overload and techno-invasion. An example of an item is "The use of technology in my job has increased my work hours". The items were assessed using a 4-point Likert scale ranging from 1 = strongly disagree to 4 = strongly agree. Higher scores indicate higher technostress. Cronbach's alpha in this study is 0.81.

Finally, meaningful work perception and pleasure in working were assessed using, respectively, the 10-item Meaningful Work scale and the 5-item Pleasure in your Work scale of the Questionnaire on the Experience and Evaluation of Work 2.0 (QEEW 2.0; Van Veldhoven et al. 2015). Both scales use a 4-point Likert scale ranging from 1 = strongly disagree to 4 = strongly agree. Higher scores indicate a higher presence of the construct. An example of an item of the Meaningful Work scale is "I feel my work is meaningful". Cronbach's alpha is 0.87. An example of an item of Pleasure in your Work scale is "I still find my work stimulating, each and every day". Cronbach's alpha is 0.74.

Data Analysis

Descriptive statistics, correlations, and reliability indices were tested using SPSS 27 (IBM, Armonk, NY, USA). The study uses a cross-sectional design. To assess reliability for all the study variables Cronbach's alpha coefficient was used. Accepted values are around or above 0.70 (Hair et al. 2011). To test the research hypotheses, a mediation model and a moderated mediation model were carried out using, respectively, Model 4 and Model 14 of the PROCESS Macro for SPSS (version 3.5; Hayes 2018). Furthermore, the indirect effects were assessed using the bootstrapping method with 5,000 replications. The indirect effects are significant when the 95% confidence interval does not include zero (Hayes 2018).

RESULTS

Table 1 shows means, standard deviations, and correlations between the study variables. As expected, online teaching and technostress are positively related. Technostress and pleasure in working are negatively associated, but their relationship is not statistically significant. Conversely, meaningful work is positively related to all the other variables.

Table 1. Means, standard deviations, and correlations among study variables (N = 219).

Variable	Mean	SD	1	2	3	4
1. Online teaching	2.64	0.95	1			
2. Technostress	2.73	0.95	0.327 **	1		
3. Meaningful work	2.71	0.77	0.151 *	0.070	1	
4. Pleasure in working	3.24	0.66	0.170 *	-0.122	0.420 **	1

* $p < 0.05$ ** $p < 0.01$.

Before using the proposed model for testing the research hypothesis, a mediation analysis was carried out to investigate the mediating role of technostress without the moderator, using Model 4 of PROCESS (Hayes 2018). Results are summarized in Table 2.

Table 2. Mediation effect of technostress in the relationship between online teaching and pleasure in working (N = 219).

Predictors	Model 1—Technostress		Model 2—Pleasure in Working		Model 3—Pleasure in Working (Total Effect Model)	
	β	SE	β	SE	β	SE
Gender	-0.042	0.450	0.093	0.370	0.109	0.376
Age	0.125	0.025	-0.120	0.021	-0.147	0.021
Years in the role	-0.023	0.207	-0.097	0.170	-0.092	0.173
Online teaching	0.416 **	0.044	0.232 **	0.040	0.142 **	0.037
Technostress			-0.216 **	0.056		
R^2	0.184		0.115		0.077	
F	11.39 **		5.21 **		4.19 **	

** $p < 0.01$. Gender was coded so that male = 0.5 and female = -0.5.

After controlling for gender, age, and years spent in the role, results show that, as expected, online teaching is positively related to technostress ($\beta = 0.416$; bootstrap 95% C.I. = 0.198; 0.372), which in turn is negatively related to pleasure in working ($\beta = -0.216$; bootstrap 95% C.I. = -0.284; -0.056). However, contrary to what we hypothesized, the direct effect of online teaching on pleasure in working is positive ($\beta = 0.232$; bootstrap 95% C.I. = 0.047; 0.203). Model 3 of Table 2 represents the total effect model. It shows that also when combined with the indirect effect through technostress ($\beta = -0.090$; bootstrap 95% C.I. = -0.156; -0.024), the relationship between online teaching and pleasure in working remains significant and positive. Therefore, online teaching is positively associated with pleasure in working both directly and indirectly through technostress, which partially mediates the relationship. The act of teaching through online methods, alone, does not have a detrimental effect on teachers' pleasure in working, even if the role of technostress is certainly negative.

To verify the moderating role of meaningful work, a moderated mediation model was tested by using Model 14 of PROCESS (Hayes 2018). Gender, age, and years spent in the role were used as control variables. Results are presented in Table 3.

Table 3. Moderated mediation effects (N = 219).

Predictors	Model 1—Technostress		Model 2—Pleasure in Working	
	β	SE	β	SE
Gender	-0.296	0.450	0.431	0.333
Age	0.042	0.025	-0.029	0.019
Years in the role	-0.064	0.207	-0.132	0.154
Online teaching	0.285 **	0.044	0.082 *	0.036
Technostress			-0.166 **	0.052
Meaningful work			0.194 **	0.032
Technostress X Meaningful work			-0.026 *	0.010
R^2	0.184		0.289	
F	11.39 **		11.49 **	

* $p < 0.05$ ** $p < 0.01$. Gender was coded so that male = 0.5 and female = -0.5.

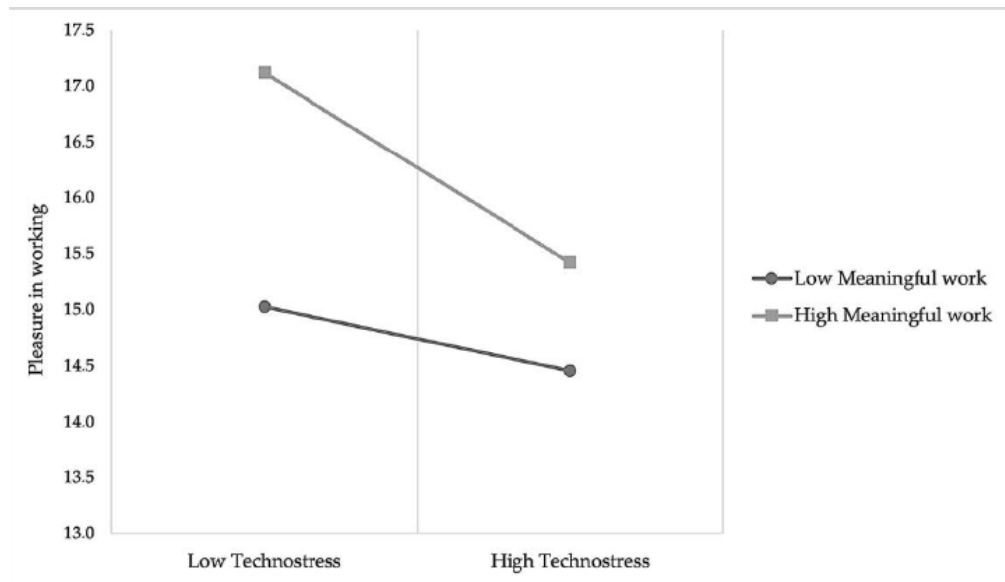


Figure 2. Conditional effects of technostress on pleasure in working at different values of the moderator (N = 219).

In conditions of high technostress, teachers with lower meaningful work perceptions experience significantly lower values of pleasure in working compared to teachers with higher levels of meaningful work perceptions. The perceptions of the meaningfulness of the teaching job have a significant role also

in conditions of low technostress since low meaningful work is related to significantly lower values of pleasure in working.

DISCUSSION

The study aimed to examine the relationships between technostress, online teaching, pleasure in working, and meaningful work perceptions among teachers during the COVID-19 pandemic. We hypothesized that online teaching would relate to the pleasure in working both directly and indirectly through technostress and that this relationship could be moderated by teachers' perception of the meaningfulness of their work. Results show that online teaching leads to pleasure in working both directly and indirectly through technostress. Surprisingly, the direct relationship between online teaching and pleasure in working is not negative. The online method of teaching is not associated with a decrease in teachers' positive feelings about their work. Of course, it must be considered that the data of this study were collected at a time when teachers had already become widely accustomed to online teaching and had also been able to experience its potential. This may explain why the relationship with pleasure in working is positive. Furthermore, this result has confirmation in the literature, since in the exploratory study by Giovannella and colleagues (Giovannella et al. 2020), online teaching was not perceived in a particularly negative way by teachers, and one-third of the sample declared that they would prefer to continue teaching in blended mode.

However, and as expected, online teaching is positively associated with technostress, which is in turn negatively associated with pleasure in working. Technostress partially mediates the relationship between online teaching and pleasure in working, significantly dampening it. This relationship was predictable, as the nature of online education requires the use of technology. The result is in line with the reference literature, as the massive use—and even sudden and improvised, in the case of the pandemic period—of technology is connected to negative outcomes for work-related well-being (Aktan and Toraman 2022; Camacho and Barrios 2022). Moreover, the indirect effect of online teaching on the pleasure in working through technostress is moderated by the perceived meaningfulness of the work. In conditions of low meaningful work, the indirect effect is lower when compared to the condition of high meaningful work. This means that the total effect of online teaching on pleasure in working is lower when the meaningfulness is high. As previously mentioned (Minkkinen et al. 2020), some characteristics of the meaningful work construct and the teaching profession may overlap. Some of them, such as the ability to create meaningful relationships with students, can be put at risk with distance learning, which introduces a physical and even psychological distance (Muñoz-Chávez et al.

2022). The teacher's job may be culturally linked to the idea of being present and close to the students, even physically. Consequently, the meaningfulness related to the teacher's role could negatively interact with online teaching. This result should be further investigated in future research. As for the moderation effect of meaningful work on the negative relationship between technostress and the positive feelings related to one's work, results showed that the perceived meaningfulness of work acts on this relationship so that the levels of pleasure in working are significantly higher for teachers who have a higher level of meaningful work, and this occurs in both low and high technostress conditions. This result is also confirmed in the literature, specifically in studies that link meaningfulness to work engagement, even in conditions of work frustration (Ugwu and Onyishi 2018), and in studies that have demonstrated the buffering effect of meaningful work on stress factors at work (Pace et al. 2022; Minkkinen et al. 2020).

It can be concluded that perceiving one's work as meaningful and relevant, for oneself and others, takes on a protective role, dampening the negative effect of technostress, even during an emergency such as the COVID-19 pandemic.

Limitations and Future Research

The cross-sectional design prevents drawing causal interpretations of the relationships between the variables. Therefore, a longitudinal design should be preferred in future research to validate the results. Moreover, other measures strictly related to pandemic-related stress should be implemented to assess the potential influence of COVID-19 on the relationships between the study variables. Other limitations stem from the exclusive use of self-report measures and the convenience sample, which prevents the generalization of results. Regarding the sample, a large percentage is constituted by subjects working for less than a year, and this is a further limitation to the generalization of the results. Future research should test the present study's hypotheses on a larger and more balanced sample. Finally, the results presented in this study and the related implications are deeply connected with the context in which they were obtained, that is the specificity of the pandemic situation in Italy and its management by the Italian government. This constitutes a great limit to the external validity of the study.

CONCLUSIONS

Although most subjects started online teaching due to an emergency (and therefore with little notice and support), it seems that this experience had little impact on the intrinsic pleasure the teaching job gives. If anything, the lack of aptitude for technology (evidenced by the weight of technostress) plays a role in making the teaching job less pleasant. The data also suggest that this relationship

is mitigated by the individual's perception of performing meaningful work. The conclusions and implications are several.

First, we believe it is important to highlight the protective role of the meaning given to the teaching job. Although avoiding the rhetoric of work as a mission, the importance of meaningful work as a form of support to overcome daily difficulties must nevertheless be emphasized and counted among the so-called individual resources in the models for assessing stress in the workplace (Bakker and Demerouti 2017). A practical implication is to suggest more stringent procedures in the selection processes of teaching staff for what concerns the evaluation of motivation for the role, alongside the necessary assessment of the knowledge to be transmitted. At the same time, to mitigate the highly demanding weight of the teaching profession, it might be useful to suggest the implementation of initiatives aimed at strengthening the sense of importance and significance of the profession. Implementing convergent policies in this direction could bring benefits not only in terms of worker protection but also in terms of the general effectiveness of school structures.

Another inference that we believe can be drawn from this study is the importance of providing technical support for teachers. With technical support, we do not refer exclusively to the supply and enhancement of technological infrastructures, which seem to have been implemented by governments as a first response to counter the risk of interruption of school activities. Instead, the desirable technological support refers, more generally, to a clear and articulated teacher training program about the functional integration of the various technologies for teaching purposes, based on the consolidated successful experiences of online teaching methodologies that had been implemented before the pandemic situation. As the data suggest, the transition to remote forms of teaching per se appears to have little impact on the intrinsic pleasure of working, but it becomes more burdensome when and if the subject is unfamiliar with technologies or experiences other difficulties related to the fruitful use of technology.

Given the rapid transformation of the education sector following the pandemic situation, the need for interventions to support the technological deficiencies manifested by teachers is evident, in order to obtain the double result of protecting this category of workers and improving their work performance.

Conflicts of Interest: The authors declare no conflict of interest.

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