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“We never stop learning!”. Teachers’ perceptions of distance learning strengths related to their professional growth and intention to integrate technology

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DISTANCE LEARNING AND INTENTION TO INTEGRATE TECHNOLOGY

“We never stop learning!”. Teachers’ perceptions of distance learning strengths relate to their professional growth and intention to integrate technology

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Abstract

This study had three aims: validating two new scales to measure teachers' perceptions of Distance Learning strengths (DLS) and weaknesses (DLW) during the COVID-19 pandemic; testing whether these perceptions related to technology integration into in-person teaching; and investigating whether professional growth mediated this relationship. Two studies involving Italian teachers were conducted. Study 1 (N = 326) explored the factor structure of the new scales, whereas Study 2 (N = 554) tested the hypothesised mediation implementing structural equation models. Results showed that perceived DLS, and not DLW, were positively related to teachers' technology integration, both directly and indirectly via increased professional growth.

Keywords: Distance Learning; Teachers' Perceptions; Professional Growth; COVID-19; Technology Integration in Education; Emergency Remote Teaching.

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1. Introduction

During the COVID-19 pandemic (March 2020 – May 2023, United Nations, 2023), school systems underwent profound transformations, marked by the *Great Online Transition* (Howard et al., 2022). During this emergent forced shift to digital learning environments, teachers had to navigate distance learning (DL), adapting their instruction to new technology-based methods (OECD, 2022). Teachers struggled significantly with the shift to DL (Ma et al., 2022; Marshall et al., 2024), but they also acknowledged the benefits of DL and developed skills in response to the technological demands of the COVID-19 pandemic (Ferdig et al., 2020). These results suggest that the Great Online Transition has the potential to catalyse a long-awaited technological revolution in education (Moorhouse & Wong, 2022; Tondeur et al., 2023).

To support teachers during this transformative moment, further research is needed to identify factors that encourage them to integrate the technological tools they implemented during the COVID-19 pandemic into in-person teaching. Accordingly, the present study focused on the relation between teachers' perceptions of DL, their professional growth and their intention to integrate technology. Specifically, teachers' perceptions of DL—particularly its strengths and weaknesses—may have influenced their experience with technology, supporting or hindering their intention to integrate it into in-person teaching. In addition, the skills teachers developed during the COVID-19 pandemic may have increased their sense of professional growth, in turn supporting their intention to integrate technology.

In line with that, the study had three main aims: 1) assessing teachers' perceptions of DL, distinguishing its strengths and weaknesses; 2) testing whether these perceptions relate to teachers' intention to integrate technology into in-person teaching; 3) testing whether perceived professional growth mediates this link. To fulfil these aims, we carried out two studies. Study 1 took place in May 2021 and aimed to develop two new scales to measure teachers' perceptions of DL strengths and weaknesses and explore their factor structure. Study 2 took place in May 2022 and aimed to

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validate the factor structure of the new scales and to test relationships between teachers' perceptions of DL, professional growth and intention to integrate technology into in-person teaching through structural equation modelling. Together, these two studies contributed to the literature on technology integration in post-pandemic education in two ways. First, by providing new instruments to assess the complexity of teachers' perceptions of DL, including both its strengths and weaknesses. Second, by emphasising the key role of teachers' perceptions of DL and their perceived professional growth as factors that contribute to technology integration.

2. Theoretical Background

2.1. Teachers' Perceptions of Distance Learning and Intention to Integrate Technology

During the COVID-19 pandemic, teachers were forced to implement DL, namely a temporary switch to remote teaching to keep providing students with instruction that would have been delivered in person under normal circumstances (also called Emergency Remote Teaching, Hodges et al., 2020). DL was based on the rapid and massive implementation of new technology tools that, in some cases, teachers did not feel prepared to use (OECD, 2022). The implementation of DL considerably changed teachers' job-related activities and the teaching environment (Hodges et al., 2020), forcing teachers to adjust to technological innovations.

When technological innovations are introduced in educational settings, teachers' perceptions and attitudes towards technology play a crucial role in their integration (Kim et al., 2013; Walker et al., 2020). This idea aligns with existing models on technology integration in professional contexts, among which the Technology Acceptance Model (TAM; Davis, 1989) is one of the most widely used. TAM proposes that users' perceptions of technological innovations are key predictors of technology acceptance and integration (Davis, 1989; Venkatesh & Davis, 2000). In its original version, two primary factors were identified: perceived usefulness—users' belief that technology can facilitate task performance—and perceived ease of use—users' perception of

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technology's user-friendliness (Davis, 1989). Later extensions of the model introduced additional factors, such as perceived external control and perceived enjoyability, further refining the possibility to predict users' intention to integrate technology into their daily lives (see Marangunić & Ganić, 2015). TAM and its subsequent evolutions (e.g., TAM2, TAM3, and the Unified Theory of Acceptance and Use of Technology) are considered among the most effective models for understanding and predicting technology acceptance in professional contexts.

Technology acceptance theories have been extensively used in educational contexts (Ganić & Marangunić, 2019) to explore how students' and teachers' perceptions of new technology influenced their intention to integrate technology in learning and teaching. Several studies explored the perceptions and acceptance of digital technologies by pre-service and in-service teachers from different school levels (from primary to tertiary education; for meta-analysis, Scherer et al., 2019) and on different technology tools (e.g., Immersive Virtual Reality, Chen et al., 2024; Artificial Intelligence, Ma & Lei, 2024).

Even during the COVID-19 pandemic, technology acceptance theories were used as a framework to explore whether and how teachers integrate technology. For instance, Cacciamani et al. (2022) and Gabbiadini et al. (2023) explored the relationship between Italian university teachers' perceptions of DL and their intention to integrate technology in their teaching, further including the role of other variables such as teaching flexibility and technostress. Hong et al. (2021) found similar results in Chinese preschool teachers, demonstrating that computer self-efficacy, external control and job relevance were related to perceived usefulness and perceived ease of use, which, in turn, were related to intention to integrate technology during the COVID-19 pandemic. Finally, Drueke et al. (2021) showed that German faculty members who reported high levels of perceived usefulness for the video recording system enforced during the COVID-19 pandemic used the system more than their colleagues. These studies either strictly adhered to the TAM model, exploring mainly its core

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variables (e.g., perceived usefulness), or they focused specifically on one type of technology tool (i.e., video recording systems, Druke et al., 2021).

Nevertheless, DL entailed more radical and complex changes in teachers' working routines and environments. Indeed, several studies reported that teachers identified both strengths and weaknesses of DL. For instance, Soncini et al. (2021) showed that Italian primary, middle and secondary school teachers identified several weaknesses, such as the widening of students' economic-digital divide and loss of their professional value. Other challenges reported by primary, secondary and tertiary teachers in different countries were the increase in workload (Kim et al., 2023), and increased time consumption to convert regular teaching into online teaching (Damşa et al., 2021), and connectivity issues (Mseleku, 2020). Silva et al. (2022) showed that Portuguese higher education teachers were, on the one hand, satisfied with their overall DL experience because it allowed them to use new technologies. On the other hand, they recognised that grading students online was challenging. Along the same line, DeCoito and Estaiteyeh's (2022) findings suggested that primary and secondary Canadian teachers recognised some strengths of DL (e.g., higher student engagement) as well as several weaknesses (e.g., time constraints and assessment practices).

These findings suggest that the various changes that have occurred in teachers' working environments during the COVID-19 pandemic have been perceived either as strengths (henceforth DLS) or as weaknesses (DLW) of DL. This duality can be framed in the light of the Job Demands-Resources model (JDR, Bakker et al., 2023). The JDR is a flexible model developed to understand how work-related features influence workers' outcomes and well-being (Demerouti et al., 2001). This model postulates that every job, including teaching, is characterised by job resources—positive job factors that support workers' motivation and enhance the quality of their working outcomes—and job demands—psychologically taxing aspects of the job that drain workers' energy and reduce their motivation (Bakker et al., 2023; Shamsi et al., 2021). In the context of this study, the idea of job resources and demands can be used to account for the various strengths and weaknesses

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teachers perceived of DL. In line with that, it is possible to frame DLS as potential job resources, reflecting aspects that motivated teachers, such as job flexibility and autonomy (e.g., Evers et al., 2016; 2017). Conversely, DLW can be framed as potential job demands, such as increased workload and loss of professional value (Soncini et al., 2021).

Given the complexity of the changes teachers faced during the COVID-19 pandemic, we propose that a more comprehensive explanation of the factors influencing teachers' intention to integrate technology is needed to encompass other variables beyond the TAM's core predictors (e.g., perceived ease of use). To address this, the present study combines the conceptualisation of job resources and job demands, as postulated by the JDR, with the key role of teachers' perceptions to promote technology integration, as postulated by TAM. This integrated approach allows for an understanding of how perceptions of DLS and DLW may have shaped teachers' intentions to integrate technology into in-person teaching after the COVID-19 pandemic.

Accordingly, the first aim of the present paper was to explore and assess teachers' perceptions of DLS and DLW, proposing a multidimensional and comprehensive measurement of these perceptions. Previous studies conducted during the COVID-19 pandemic were mostly based on technology acceptance theories and measured factors specifically related to these theories (i.e., perceived ease of use; Hong et al., 2021) or perceptions on specific tools (i.e., video recordings; Drueke et al., 2021). In addition, at the time the study was conducted, the available literature on teachers' perspectives about DL was mainly qualitative (e.g., Kim & Asbury, 2020), or teachers' perceptions of DL were measured with only a few items and not related to more complex theorisation (e.g., Soncini et al., 2021).

Developing an instrument to measure teachers' perceptions of DLS and DLW was necessary to fulfil the second aim of this study, namely, to test whether these perceptions are associated with teachers' intentions to integrate technology into in-person teaching. In the present study, we define teachers' intentions to integrate technology as their willingness to adopt

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technology tools in their teaching routines (also defined as *behavioural intention to use technology*, Davis et al., 1989). We expected that teachers who perceive more DLS would report a greater intention to integrate technology into resume in-person teaching. Conversely, we expected that teachers who perceive more DLW would report a lower intention to integrate technology.

2.2. The Mediating Role of Teachers' Professional Growth

The third aim of the study was to investigate a potential process underlying DL perceptions and technology integration. Specifically, we focused on the professional growth teachers experienced while implementing DL, which may mediate the relationship between perceptions of DL and technology integration. Schaufeli and Bakker (2004) framed professional growth as the result of an ongoing learning process and adjustment to new and challenging working conditions, which implies skills enhancement and leads to better working performances. Along the same line, we define professional growth (from now on, *perceived professional growth*) as the experience of increased job-related skills and knowledge gained during the challenging situation posed by the COVID-19 pandemic.

In line with the JDR model, job resources (i.e., DLS) are closely associated with professional growth since they support learning and aid in achieving work-related goals (Bakker et al., 2023). Some studies on secondary school teachers found that job resources, like job-related autonomy and perceived support, are conducive to learning and growth (e.g., Evers et al., 2017; Jansen de Wal et al., 2018). Thus, we expected that teachers who perceive higher DLS experience more professional growth.

The link between job demands (i.e., DLW) and professional growth is still debated in the literature (e.g., Evers et al., 2017; Jansen de Wal et al., 2018). A growing body of research has shown that job demands can influence workers' behaviours differently, depending on whether they are experienced as a challenge, with potential for growth and rewards, or a hindrance, with undesirable constraints that prevent workers from growing and achieving work-related goals (Li et

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al., 2020). Considering previous evidence about teachers' working experiences during DL, switching to DL has been very demanding and overwhelming for teachers. For instance, Italian primary, middle and secondary school teachers experienced a loss of teaching value and an increased workload (Soncini et al., 2021), which are job demands linked to negative outcomes and a lack of professional growth (Wallin et al., 2022). These findings suggest that DLW may have been perceived as a hindrance rather than a challenge. Therefore, we expected that teachers who perceive more DLW experience less professional growth.

Finally, we argue that perceptions of professional growth during DL may be related to the intention to integrate technology into in-person teaching. During the COVID-19 pandemic, teachers developed technology competencies (see Howard & Tondeur, 2023; for example, Moorhouse & Wong, 2022) and gained a stronger sense of mastery over technology (Kim et al., 2024; Ma et al., 2021). New competencies and the acquired confidence in using technology are linked to teachers' intentions to continue using technology-based teaching approaches. For instance, Stumbrienė et al. (2024) found that primary school teachers' perceptions of either being confident and skilled with technology or not are a main factor influencing their willingness to transfer new technological skills into in-person teaching. Similarly, interviews with primary school teachers revealed that those who implemented technology during the COVID-19 pandemic reported a greater willingness to use it in in-person teaching (Moorhouse, 2024). This link between gained experience and intention to use technology is addressed in an extended version of the TAM (TAM3, Venkatesh & Bala, 2008), which acknowledges the role of experience, skills and competencies as a factor influencing technology integration intention. Based on these results, we expected that teachers who experience more professional growth report greater intention to integrate technology in resumed in-person teaching.

2.3. The present study

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Notwithstanding this evidence, no study has explored whether different teachers' perceptions of DLS and DLW played a role in supporting those teachers' intention to integrate technology through perceived professional growth. Indeed, most of the studies focused either on teachers' perceptions of specific technology tools (e.g., Hong et al., 2021) or only on teachers' positive perceptions of technology (e.g., Cacciamani et al., 2022) or on teachers' competencies with technology (see Howard & Tondeur, 2023), overlooking the role of their perceptions on the overall DL experience.

To fill this gap, this study sought to contribute to the literature by 1) measuring teachers' perceptions of DLS and DLW; 2) testing the link between DLS and DLW and teachers' intentions to integrate technology; 3) testing whether this link is mediated by perceived professional growth. More precisely, we formulated the following hypotheses (Figure 1):

H1a: Perceived DLS was positively related to teachers' intention to integrate technology.

H1b: Perceived DLW was negatively related to teachers' intention to integrate technology.

H2a: Perceived DLS was positively related to teachers' perceived professional growth.

H2b: Perceived DLW was negatively related to teachers' perceived professional growth.

H3: Perceived professional growth was positively related to teachers' intention to integrate technology.

Figure 1

Hypothesised Mediation Model

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invited Italian teachers through their formal school email addresses to participate in an online survey created on Qualtrics. At the beginning of the questionnaire, the participants were informed about the study's aim and the anonymity of the responses. A total of 326 Italian teachers ($M_{age} = 48.37$, $SD = 9.49$; $M_{teaching\ experience} = 18.09$, $SD = 11.17$; 84.8% women) filled in the questionnaire. Most of them were highly educated (83.70% have a bachelor's degree) and were teaching in primary (37%), middle (12.70%) and secondary (50.30%) schools.

3.1.2. DLS and DLW scales development

To create the scales, we relied on three different sources. The first was evidence on teachers' perceptions of distance learning during the pandemic, already published in late 2020, with international (e.g., Kim & Asbury, 2020) and national focuses (INDIRE, 2020). The second was the literature on distance learning and e-learning published before the COVID-19 pandemic (e.g., Choudhury & Pattnaik, 2020). The third was based on preliminary results of interviews we carried out at the end of the first school closures (May 2020) with Italian teachers ($N = 33$). Combining this evidence, we identified five DLS dimensions and eight DLW dimensions. We created a pool of 4-6 items for each dimension with a 5-point Likert scale (1 = *Completely disagree*; 5 = *Completely agree*). Table S1 in the Supplementary Online Materials (henceforth, SOM) reports the first version of the scales.

3.2. Analytical Strategy

As a first step, we checked for missing data patterns. The Little MCAR test was not significant, meaning that the data were missing completely at random (less than 5% of data were missing). Then, we ran several Exploratory Factor Analyses (EFA) using SPSS 28, to test the factor structure of the two scales. We used Maximum Likelihood Estimation (MLE) to extract the factor, and Direct Oblimin as a rotation method, since we assumed that the different factors were correlated. We did not force the analyses on a particular number of factors.

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3.3. Results

As for the DLS scale, the analysis extracted four factors that explain together 54.59% of the variance. The factors extracted after the rotation did not completely represent the hypothesised structure, and thus, we checked the wording of the items and excluded those that showed the lowest factor loadings ($< .30$). We ran another EFA with a reduced pool of items (12 total). The Kaiser-Meyer-Olkin test was really good, .83, and the test of Bartlett was significant ($p < .001$), indicating that the sample was adequate, and the correlation matrix was significantly different from zero. This second analysis extracted four factors (Table S2, SOM). The final DLS scale was composed of 12 items divided into four subdimensions: *Teaching Innovation*, the possibility of implementing new learning activities; *Increasing students' responsibility*, the idea that students become more and more responsible and autonomous in their learning path; *Job flexibility*, the possibility of managing freely the working time and activities; *Customising Teaching for Special Needs Students*, the possibility of individualising teaching activities based on students' needs.

As for the DLW scale, the first EFA showed slightly different factor patterns than expected. The analysis extracted five factors instead of six, with some factors merging items belonging to different hypothesised subscales. We deleted the reverse items and those that showed the lowest factor loadings ($< .30$), and we ran another EFA, keeping only three items for each subdimension (18 items in total). The Kaiser-Meyer-Olkin test was excellent, .87, and the test of Bartlett was significant ($p < .001$), indicating that the sample was adequate, and the correlation matrix was significantly different from zero. This second analysis extracted six factors (Table S3, SOM). The final DLW scale was composed of 18 items divided into six subdimensions: *Disrupted teacher-student relationships*, the difficulty in maintaining a good and stable relationship with students; *Increased Digital and economic divide*, the perception that distance learning exacerbates differences between students; *Organisational teaching demands*, the perception that distance learning increases teaching demands, such as workload; *Loss of evaluation and control*, the augmented difficulties in

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evaluating students' performance and controlling students' learning achievement properly; *Lack of students relationship*, the difficulty for students to keep good and stable relationships with each other; *Diminishing teaching value*, namely the feeling that the value of teachers' work was diminishing while using distance learning.

4. Study 2

4.1. Method

4.1.1. Procedure and Participants

Before starting the data collection, the last author's university Ethical Committee approved the study's research protocol (n. 0122492, 27/04/2022). To recruit the participants, we followed the same procedure implemented for Study 1. After the data cleaning, the final sample included 554 Italian teachers ($M_{age} = 49.05$, $SD = 9.17$; $M_{teaching\ experience} = 18.72$, $SD = 10.40$; 83.3% women) from 10 different Italian regions. Most of them were highly educated (76% with bachelor's degrees) and were teaching in primary (33%), middle (18%), and secondary (45%) schools.

4.1.2. Measures

Teachers' perceptions of DLS and DLW. These two variables were measured through the new scales developed in Study 1. The scales were presented with a 5-point Likert scale (1 = *Completely disagree*; 5 = *Completely agree*).

Perceived Professional Growth. To measure teachers perceived professional growth, we adapted four items proposed by Daniels et al. (2009) to measure workers' learning (e.g., "Through DL, I learned new things that improved me as a teacher."). The scale was presented with a 5-point Likert scale (1 = *Completely disagree*; 5 = *Completely agree*).

Intention to Integrate Technology. To assess teachers' intention to integrate technology in the future, we used the scale Intention of Future Use developed by Cacciamani et al. (2022). The

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scale comprised 4 items (e.g., “Considering I may have access to distance learning tools in the future, I would like to use them”) and was presented with a 6-point Likert scale (from 1 = *Completely disagree* to 6 = *Completely agree*).

Control variables. As control variables, we measured teachers’ age, years of teaching experience, gender, educational level, the school level where they taught and their self-reported experience with educational technology tools before DL. We measured this last variable to control whether teachers’ experience with educational technology affected their professional growth and their intention to integrate technology. To measure it, we asked teachers to rate their experience with technology tools before DL on a 6-item scale (e.g., “Before the start of the COVID-19 pandemic, how much experience you had with educational online platforms?”). Teachers replied on a 5-point Likert scale (from 1 = *None* to 5 = *A lot*).

All the scales were presented in Italian, and the final version of the questionnaire that was presented to teachers is shown in Appendix A.

4.2. Analytical Strategy

As a first step, we checked the missing data pattern in the dataset. The Little MCAR test was significant, $\chi^2(3784) = 4183.920, p < .001$, and we used the Expectation Maximization procedure to impute missing data on SPSS 28. We then test the factorial structure of the DLS and DLW scales through Confirmatory Factor Analyses (CFA) using Mplus version 6 (Muthén & Muthén, 2011). We set all the models using the Maximum Likelihood Robust chi-square estimator (MLR). We followed the cut-off criteria proposed by Hu and Bentler (1999) to assess the models’ fit. Specifically, the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) should be higher than .90, the Root Mean Square Error of Approximation (RMSEA) lower than .06, and the Standardised Root-Mean Residual (SRMR) lower than .08. To compare models, we used the Satorra-Bentler scaled chi-square formula (Satorra & Bentler, 2010). Besides testing the factor structure of the scales, we also checked the fit indexes of the measurement model (Kline, 2015), and

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tested the structural model, which included the dependent, independent and mediation variables as well as control variables to test the hypotheses.

4.3. Results

4.3.1. *Confirmatory Factor Analyses*

As for the DLS and DLW scales, we compared different models. In Model 1, all the items of the scales loaded on one single factor; in Model 2, the items loaded on the different subscales extracted from the exploratory factor analysis; and in Model 3, these different subscales loaded on a super-ordinate factor useful for the hypothesis testing. Results of the analyses showed that Model 2 and Model 3 outperformed Model 1, confirming the factor structure of both scales (Table S4 in the SOM). As for perceived professional growth, we tested Model 1, where all the items loaded on one factor. Since the results did not fit well, we tested another model (Model 2) correlating the errors between two items. Model 2 outperformed Model 1. As for the Intention to integrate technology in the future, we estimated only one model that showed a good fit (Table S4 in the SOM). For further details on factor loadings, see Tables S5 and S6 in the SOM.

Since we wanted to implement a structural equation model, we test the measurement model (Figure S1, in the SOM) that showed a good fit with the data, $\chi^2(923) = 1775.232, p < .001$, RMSEA = 0.041 (90%C.I. 0.038-0.044), CFI = 0.927, TLI = 0.922, SRMR = 0.062. As shown in Figure S1, the correlation between the latent variables DLS and DLW is quite high (-.771), and thus, we checked multicollinearity problems by calculating the Variance Inflation Factor (VIF)¹. The VIF was 1.565, and thus, multicollinearity was not problematic.

4.3.2. *Descriptive Statistics*

As reported in Table 1, Cronbach's alphas showed satisfactory reliability for all measures and all the variables were associated in the expected direction at the bivariate level. What is

¹ The VIF is a measure of the correlation between two independent variables. If its value is close to 1, the two variables are adequately correlated to be both considered predictors. If the value is above 5, the two variables are too correlated, and it may pose problems for the estimation of the model (Belsley et al.,1980).

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interesting to note is that teachers reported perceiving a higher level of DLW than DLS. For descriptive statistics and bivariate correlations of the different sub-dimensions see Table S7 in the SOM.

Table 1

Descriptive Statistics, Bivariate Correlations, Internal Consistency of the Composite Score of the Variables Used in the Structural Equation Path Model

	1.	2.	3.	4.
1. DLS	-	-.596***	.562***	.614***
2. DLW		-	-.373***	-.475***
3. Perceived Professional Growth			-	.558***
4. Intention to Integrate Technology				-
<i>M</i>	2.87	3.79	3.69	3.97
<i>(SD)</i>	(0.65)	(0.63)	(0.86)	(1.33)
Range	1-5	1-5	1-5	1-6
α	.879	.900	.889	.839

4.3.3. Structural Equation Path Model

In order to test our hypotheses, we implemented a structural equation path model including the latent variables (i.e., DLW and DLW as independent variables; Perceived professional growth as mediator; Intention to integrate technology as dependent variable) and demographic information as control variables (i.e., age, gender, teaching experience, educational level, school level where the teacher worked and self-reported experience with technology before DL). The structural model showed a good fit with the data, $\chi^2(875) = 1659.722, p < .001, RMSEA = 0.040$ (90%C.I. 0.037-0.043), CFI = 0.925, TLI = 0.920, SRMR = 0.060.

As for our hypotheses, according to our results (Table 2), teachers who perceived greater DLS showed an increased intention to integrate technology, confirming H1a. Conversely, teachers who perceived greater DLW did not show a decreased intention to integrate technology, meaning that H1b was not confirmed. Additionally, teachers who perceived greater DLS experienced greater professional growth, confirming H2a, while teachers who perceived greater DLW did not experience lower professional growth, thus H2b was not confirmed. Finally, in accordance with H3,

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teachers who perceived greater professional growth showed and increased intention to integrate technology into resumed in-person teaching.

Different from our expectations, perceptions of DLW were not significantly related to teachers' professional growth and technology integration. This lack of relationship may be due to statistical aspects. The correlations between DLS with professional growth (mediator) and intention to integrate technology (DV) are rather high, .672 and .753 respectively (Figure S1). Therefore, the effect of DLS on the dependent variables could alone explain a rather high portion of the variance, obscuring the effect of DLW on the outcome variables. By calculating a model where only DLW is presented as a predictor, Model fit: $\chi^2(414) = 811.547, p < .001$, RMSEA = 0.042 (90% C.I. 0.037-0.046), CFI = 0.938, TLI = 0.932, SRMR = 0.055, its relationships with professional growth ($b = -.453, S.E. = .052, p < .001$) and the intention to integrate technology ($b = -.402, S.E. = .056, p < .001$) turned out to be negative and significant, albeit weaker than those between DLS and the dependent variables. This supplementary result supports the idea that DLW is also correlated with both the mediator and the dependent variable. However, the effect of DLS explained a significant portion of the variance in both, suggesting that DLS is a stronger and more proximal predictor of perceived professional growth and intentions to integrate technology than DLW.

Regarding the control variables, only self-reported experience with technology before DL was significantly related to teachers' perceived professional growth, indicating that teachers with greater prior experience with technology reported a lower sense of professional growth. The other control variables showed no significant relationship with the dependent variables.

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Table 2

Results of the Structural Equation Path Model Analysis

	Teachers' Professional Growth	Intention of Integrating Technology
	b (S.E.)	b (S.E.)
Control variables		
Age	-0.051 (0.057)	-0.049 (0.054)
Gender ^a	-0.014 (0.056)	0.028 (0.035)
Educational level ^b	-0.021 (0.048)	0.015 (0.042)
Years of experience	0.027 (0.059)	-0.027 (0.050)
School level ^c	0.023 (0.044)	0.034 (0.042)
Self-reported technological experience before DL	-0.145 (0.048)**	0.076 (0.046)
Independent variables		
DLS	0.840 (0.108)***	0.479 (0.127)***
DLW	0.168 (0.099)	-0.099 (0.094)
Perceived Professional Growth	-	0.262 (0.077)**
Indirect Effect		
DLS-Perceived Professional Growth	-	0.220 (0.063)***
DLW-Perceived Professional Growth	-	0.044 (0.025)
Total Effect		
DLS-Perceived Professional Growth	-	0.699 (0.099)***
DLW-Perceived Professional Growth	-	-0.055 (0.10)

Note: ** $p < .01$; *** $p < .001$. ^a 1 = Female; 0 = Male; ^b 1 = Bachelor; 2 = Master; 3 = PhD. ^c 1 = primary; 2 = middle; 3 = secondary school

5. General Discussion

The present work had three aims: assessing teachers' perceptions of DLW and DLS; testing how these perceptions influenced teachers' intentions to integrate technology in resumed in-person teaching; and investigating the mediating role of teachers' professional growth. We implemented two studies to fulfil these aims. In Study 1 (May 2021), we explored and measured teachers' perceptions of DLS and DLW by developing two new scales. In Study 2 (May 2022), we validated the new scales and tested the relationship between perceptions of DL, teachers' intentions to integrate technology, and professional growth.

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The first contribution of this study is the conceptualisation of DLS and DLW, along with the provision of psychometric scales to measure teachers' perceptions of DLS and DLW. One key strength of the two scales is that they are grounded in diverse sources of evidence, including literature from before the COVID-19 pandemic and data collected directly from teachers during school closures (e.g., Soncini et al., 2021; INDIRE, 2020). Another advantage is that they provide a comprehensive view of teachers' perceptions, addressing technological aspects of DL and other job-related considerations (i.e., job flexibility, increased workload, lack of teaching value), which are crucial for understanding and supporting teachers' transition to distance learning (Mouw et al., 2023).

The scales used in this study overlap with the strengths, weaknesses, opportunities and challenges of online learning identified by Dhawan (2020), while also incorporating other positive and negative aspects explored in studies conducted during the COVID-19 pandemic (e.g., Tondeur et al., 2023). This broader focus makes our scales more suitable than others, such as the E-Learning Acceptance Measure (Teo, 2010a), and the Technology Acceptance Measure for Preservice Teachers (Teo, 2010b), used during the COVID-19 pandemic (e.g., Cacciamani et al., 2022) to capture the complex perceptions of DL. Investigating both the positive and negative aspects of DL is essential to acknowledging the complexity of teachers' experiences, which is the key factor in supporting their technology integration (Howard et al., 2021).

Furthermore, previous scales developed during the COVID-19 pandemic have not systematically captured the broader changes DL introduced, nor have they framed DL features as both resources and demands. For instance, Ciplak et al. (2023) developed the Distance Education Evaluation Scale based on three subfactors: learning environment, suitability and limitation. Although this scale addresses both positive and negative aspects of DL as perceived by teachers, the learning environment dimension encompasses different factors (e.g., students' increased participation and performance, innovative teaching activities) that have been systematised into

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different sub aspects of our scales. Therefore, with the specificity of the items and sub-dimensions included in the new scales, they can serve as a valuable tool for measuring teachers' perceptions of DL during transitions to online learning environments.

The second contribution of this study lies in identifying the role of perceived DLS in supporting technology integration into teaching practices, both directly (H1a) and indirectly via increased perceived professional growth (H2a, H3). The significant direct relationship confirms previous studies (e.g., Cacciamani et al., 2022; Hong et al., 2021) that have shown how positive perceptions of technology are related to teachers' intentions to integrate technology. Since DLS captures several job-related changes, this finding offers a more comprehensive view of teachers' perceptions of DL and its link with technology integration.

Additionally, the significant indirect effect of DLS on technology integration due to increased perceived professional growth offers a deeper understanding of the factors shaping teachers' intentions. Previous studies have shown that teachers' technological skills increased during the COVID-19 pandemic in terms of actual knowledge and competencies developed by teachers (e.g., Kalman et al., 2022; Meletiou-Mavrotheris et al., 2023; Howarde & Tondeur, 2023; Trevisan et al., 2023). Our study adds to this literature the role of perceived professional growth in fostering teachers' intentions to integrate technology, highlighting even more the key role of teachers' perceptions to support the implementation of new practices in their teaching.

Overall, these findings contributed to the literature by bridging technology acceptance theories (e.g., Davis et al., 1989) and the JDR model (Bakker et al., 2023). On the one hand, this bridge supports the idea that both technology-related and other job-related aspects are important to promote teachers' inclusion of technology. On the other hand, it echoed the idea that perceiving positive aspects of the job (i.e., job resources) supports teachers' positive outcomes, including their learning (Evers et al., 2016; Lecat et al., 2018). This suggests that professional development should not only address skill acquisition but also consider teachers' sense of growth and the benefits of DL

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in enhancing their expertise. In their qualitative study, González et al. (2023) explored teachers' technology-related competence acquired during the COVID-19 pandemic and provided recommendations for developing these competencies further. We propose enriching these recommendations with a focus on DLS, and the ways in which DL can contribute to fostering teachers' professional growth, a key aspect to helping teachers implement new teaching methods, including those based on technology.

Despite our expectations, perceived DLW was not related to either the intention to integrate technology in the future or teachers' professional growth. The JDR model (Bakker et al., 2023) offers a potential theoretical explanation for this lack of relationship. High job demands can negatively impact outcomes, such as reduced work performance. However, when job resources are available and perceived by individuals, they serve a protective function, helping individuals navigate demanding aspects of the job (Bakker et al., 2023). In the context of DL, DLS played a crucial role, offsetting the expected impact of DLW, even though DLW were perceived as more prominent than DLS, as reflected in the different mean scores of these two variables (Table 2). Given the interconnection between DLW and DLS, however, we caution against concluding that DLW have no impact.

The difference between the mean scores for DLW and DLS may also reflect that DL was, and continues to be, seen as a frustrating and overwhelming work-related change that teachers were compelled to adopt, as previous studies have shown (Soncini et al., 2023; Mseleku, 2020). These observations lead to two important remarks: First, to promote a long-awaited technological revolution in education (Moorhouse & Wong, 2022) it is essential to consider the demands associated with DL, which should never be underestimated when proposing changes to teachers' work activities and routines. Second, the findings underscore the importance of helping teachers recognise and appreciate the positive aspects of significant work-related changes, even in highly

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disruptive situations. Recognising positive aspects can foster positive outcomes, such as professional growth and learning.

5.1. Limitations

This study presents some limitations. First, the dimensions included in the proposed scales might not cover all the various strengths and weaknesses related to DL, such as the creation of interactive and collaborative learning environments or the technical issues related to technology (Dhawan, 2020). Relatedly, although the new scales demonstrate good psychometric properties, further research may help refine their assessment. Second, our model did not include other contextual variables that were important in determining teachers' experience with DL, such as the school environment and support from colleagues or school principals (Donnelly & Patrions, 2021; Stang-Rabrig, 2022). Furthermore, while the control variable on self-reported prior experience with technology provided a useful approximation of teachers' competence with technological tools, a broader assessment of self-efficacy during DL could have better captured personal resources that may have contributed to experiences of professional growth. Finally, our scale measuring the intention to integrate technology did not allow us to identify which types of tools teachers want to retain in their teaching practice and instead assumed that this intention was the same for all the devices learned and used during DL. More descriptive observations could focus on this aspect, identifying which types of technological tools and skills teachers learned during the COVID-19 pandemic and which they intend to use.

6. Conclusions

This work contributed to the literature on technology integration in education following the COVID-19 pandemic. Two different studies explored and measured teachers' perceptions of the strengths (DLS) and weaknesses (DLW) of distance learning and tested the link between these perceptions, perceived professional growth, and the intention to integrate technology into resumed

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in-person teaching. The findings highlighted the key role of teachers' perceptions of DLS to promote technology integration directly and indirectly, via their perceived professional growth. Our findings and previous evidence can together inform policymakers who would like to seize the opportunity given by the Great Online Transition to continue digitalising learning environments, placing teachers at the core. On the one hand, providing teachers with technology tools and creating innovative technology learning environments in school may help teachers retain the competencies acquired during DL. On the other hand, teachers' training should go beyond technical skills to address the work-related aspects involved in integrating technology to teachers' professional practice.

As Howard and Tondeur (2023) noted, focusing solely on the technical aspects of technological tools overlooks critical dimensions of technology integration. Effective in-service and pre-service teachers' training should not focus exclusively on the technical functioning of technology but also highlight their strengths, such as increased flexibility in teaching, and deconstruct their weaknesses. In addition, it is important to guide in-service and future teachers through a learning process that enhances their sense of professional growth, in order to encourage teachers to make improvements to their work, such as integrating new technologies to enhance teaching effectiveness and create more engaging and interactive learning environments. In this vein, large international teacher training programs focused on digital competencies, like the European Digital Education Action Plan (European Union, 2020), should take into account the findings of this study and other studies to ensure that training initiatives align with the real challenges and needs faced by educators and teachers.

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DISTANCE LEARNING AND INTENTION TO INTEGRATE TECHNOLOGY

Appendix A. The final questionnaire used for the data collection

Distance Learning Strengths

Teaching Innovation

DL allows the implementation of innovative teaching activities

DL is a good means to propose a variety of diversified innovative activities

DL allows us to learn how to use technology in learning

DL is a good way to increase your skills in using technological devices

Job Flexibility

DL allows job flexibility

While implementing DL it is possible to manage in a more flexible way the working activities

While implementing DL, it is possible to manage your working time more freely

Customising Teaching for Fragile Students

DL is effective in teaching students with various difficulties

DL provides the opportunity to better support students with learning difficulties

With DL, it was possible to customise activities for students with special learning needs

Students' Learning Responsibility

DL allows students to be more involved in their learning process

DL gives students responsibility for their learning process

During DL, students work more independently

Distance Learning Weaknesses

Disrupted Teacher-student Relationship

DL negatively affects the relationship between teachers and students

DL deteriorates the relationship with students

The educational relationship with students is disrupted while implementing DL

Increased Digital and Economic Divide

Some students do not have the necessary tools to carry out DL activities

DL increases differences between students due to difficulty in accessing technological tools

DL is not accessible by those students who cannot afford certain equipment

Organisational Teaching Demands

While implementing DL the workload increases

Too many hours are spent at the computer preparing DL lessons

It is difficult to reconcile work activities with one's private life during DL

Loss of Evaluation and Control

It is complex to assess tests in DL

While implementing DL it is difficult to check if students work alone

It is complicated to check that students do not copy during DL

Lack of Students Relationship

DL hampers students' interactions

DL decreases students' cooperation

DL decreases communication between students

Diminishing Teaching Value

DL degrades the teaching profession

Implementing DL decreases the leisure of teaching

While implementing DL, part of the value of the teaching profession is lost

Teachers' Professional Growth

Through Distance Learning...

...I learnt new things to improve my work

...I have learnt new things that help me cope better with certain difficulties related to my work

...I learnt new things that led me to an overall improvement as a teacher

..I learnt new things that allow me to solve some problems in my work faster

Intention to Integrate Technology (Cacciamani et al., 2022)

In the future, I will use some distance learning tools

I will strongly recommend other colleagues to integrate distance learning with face-to-face teaching

Assuming I will have access to distance learning, I intend to use it

I will use distance learning tools as much as possible in the future